

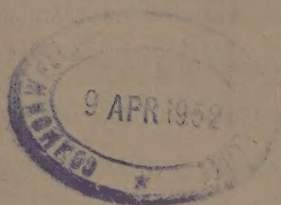
# HORTICULTURAL ABSTRACTS

INDEX TO

VOLUME XXI



1951



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COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

EAST MALLING, KENT, ENGLAND

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## SUMMARY OF CONTENTS

AUTHOR INDEX	- - - - -	<i>Pages</i> III
SUBJECT INDEX	- - - - -	XXXIII
PUBLICATIONS EXAMINED	- - - - -	CXIV
MISCELLANEOUS	- - - - -	3, 178, 314, 444
TREE FRUITS, DECIDUOUS	- - - - -	18, 190, 328, 456
SMALL FRUITS, VINES AND NUTS	- - - - -	35, 199, 340, 468
PLANT PROTECTION OF DECIDUOUS FRUITS	- - - - -	43, 203, 345, 473
WEEDS AND WEED CONTROL	- - - - -	59, 217, 358, 489
VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE	- - - - -	68, 225, 363, 498
POTATOES	- - - - -	91, 241, 379, 512
TOBACCO	- - - - -	102, 250, 384, 519
MISCELLANEOUS TEMPERATE AND TROPICAL CROPS	- - - - -	105, 253, 390, 524
FLORICULTURE	- - - - -	111, 260, 396, 532
SUB-TROPICAL FRUIT AND PLANTATION CROPS	- - - - -	122, 269, 402, 543
TROPICAL FRUIT AND PLANTATION CROPS	- - - - -	134, 276, 413, 550
NOTES ON BOOKS AND REPORTS	- - - - -	159, 292, 429, 565

### NOTICE TO USERS OF THIS AND OTHER YEARLY INDEXES

The yearly index is prepared under pressure, its aim being immediate presentation of information.

# COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

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## HORTICULTURAL ABSTRACTS

### Subject matter of abstracts

The end of a 5-year period affords an opportunity for rearranging the various headings under which abstracts appear with the minimum of disturbance to the user.

It has, therefore, been decided to make several adjustments, the main features of which will be:—

The Vegetable section will in future include every sort of vegetable, apart from potatoes, and not merely those of the temperate zones.

Potatoes and Tobacco will have separate sections with appropriate sub-divisions.

There will be a section devoted to Miscellaneous temperate and tropical crops, which cannot be classed as either fruits, flowers, vegetables or plantation crops.

The Tropical and Sub-tropical sections will both be restricted to fruits and plantation crops.

The section on Storage and plant products will be dropped and the abstracts on these subjects distributed among other sections.

In the sections devoted to particular crops the order in which the abstracts will be grouped is similar to that used in the past, namely, general, breeding and varieties, propagation and planting, cultural practices, harvesting, diseases, pests, and now storage and plant products.

Comments on the new arrangement will be welcomed.

### Availability

Copies printed on one side only can be obtained—see p. iii of cover.

### Indexing of Abstracts

Full subject and author indexes are issued for each volume, together with a list of the publications from which abstracts were made and the abbreviations used.

### Journals on closely related subjects

Plant Breeding Abstracts, Herbage Abstracts and Field Crop Abstracts, all issued by the C.A.B., deal respectively with the breeding of annual and perennial crops, with herbage problems and with field crops.



# HORTICULTURAL ABSTRACTS

Vol. XXI

March 1951

No. 1

Initialled abstracts and reviews not by Bureau staff are by A. E. Bradfield, F. W. M. Llewelyn, A. M. Massee, S. C. Pearce and A. F. Posnette of the East Malling Research Station, by the staff of the Obstbauversuchsring, Jork, Germany [O.J.] and by C. W. S. Hartley.

## INDEX OF CONTENTS.

	Nos.		Nos.
MISCELLANEOUS Abstr. 108. Noted 24	1-109x	Spray residues and spray injury	426-430
General .. .. .	1-7	Noted .. .. .	431a-431t
Statistical design .. .. .	8-10	WEEDS AND WEED CONTROL	
Meteorology .. .. .	11-16	Abstr. 78. Noted 25	432-510y
Biochemistry .. .. .	17-26	Herbicides .. .. .	432-448
Physiology .. .. .	27-51	Apparatus .. .. .	449-456
Water relations .. .. .	52-61	Particular weeds .. .. .	457-475
Growth substances .. .. .	62-76	Weed control in vegetables and	
Colchicine .. .. .	77-80	potatoes .. .. .	476-485
Radioactive materials .. .. .	81-86	Weed control in fruit crops .. .. .	486-491
Mineral nutrition .. .. .	87-94	Weed control in tropical crops .. .. .	492-501
Water cultures .. .. .	95-99	Weed control among trees and shrubs	502
Practical devices .. .. .	100-108	Control of undesirable trees and shrubs	503-509
Noted .. .. .	109a-109x	Noted .. .. .	510a-510y
TREE FRUITS, DECIDUOUS		VEGETABLES, TEMPERATE, TROPICAL AND	
Abstr. 124. Noted 20	110-234t	GLASSHOUSE Abstr. 176. Noted 46	511-688t
General .. .. .	110-123	General .. .. .	511-536
Breeding and varieties .. .. .	124-144	Brassicas .. .. .	537-556
Morphology and growth .. .. .	145-150	Celery .. .. .	557-560
Propagation .. .. .	151-156	Cucurbits .. .. .	561-570
Rootstocks .. .. .	157-164	Legumes .. .. .	571-599
Pollination and bees .. .. .	165-172	Mushrooms .. .. .	600-608
Soil management .. .. .	173-180	Onions and related plants .. .. .	609-617
Irrigation .. .. .	181-184	Root vegetables .. .. .	618-628
Nutrition .. .. .	185-190	Salad crops .. .. .	629-633
Composition .. .. .	191-197	Spinach .. .. .	634-637
Spraying to thin or retain fruit .. .. .	198-211	Sweet corn .. .. .	638-641
Pruning .. .. .	212-216	Sweet potatoes .. .. .	642-648
Harvesting and packing .. .. .	217-223	Tomatoes and related plants	649-679
Storage .. .. .	224-233	Other crops .. .. .	680-686
Noted .. .. .	234a-234t	Noted .. .. .	687a-688t
SMALL FRUITS, VINES AND NUTS		POTATOES	
Abstr. 65. Noted 13	235-300m	Abstr. 79. Noted 18	689-768r
Small fruits .. .. .	235-253	General .. .. .	689-691
Vines .. .. .	254-295	Breeding and varieties .. .. .	692-703
Nuts .. .. .	296-299	Propagation and planting .. .. .	704-709
Noted .. .. .	300a-300m	Cultivation and nutrition .. .. .	710-715
PLANT PROTECTION OF DECIDUOUS FRUITS		Composition .. .. .	716-720
Abstr. 130. Noted 20	301-431t	Virus diseases .. .. .	721-727
General .. .. .	301-306	Fungous and bacterial diseases	728-739
Disturbances of nutrition or of		Nematodes .. .. .	740-744
unknown origin .. .. .	307-317	Insect pests .. .. .	745-753
Climatic factors .. .. .	318-328	Effects of insecticides on potatoes	754-758
Viruses .. .. .	329-343	Defoliant .. .. .	759
Bacteria .. .. .	344-345	Storage and sprout inhibition	760-767
Fungi .. .. .	346-358	Noted .. .. .	768a-768r
Nematodes .. .. .	359	TOBACCO	
Mite and insect pests .. .. .	360-395	Abstr. 26. Noted 6	769-795f
Other pests .. .. .	396-397	General .. .. .	769-771
Antibiotics .. .. .	398-402	Cultivation and nutrition .. .. .	772-777
Fungicides .. .. .	403-411	Composition .. .. .	778-781
Insecticides .. .. .	412-419	Diseases .. .. .	782-788
Spraying methods and apparatus .. .. .	420-425	Pests .. .. .	789-792
		Harvesting and processing .. .. .	793-794
		Noted .. .. .	795a-795f



			Nos.				Nos.
MISCELLANEOUS TEMPERATE AND TROPICAL							
CROPS	Abstr. 40.	Noted 15	796-836o	Passion fruit	..	..	1000
Drug plants	..	..	796-800	Persimmons	..	..	1001
Essential oils	..	..	801-805	Tung	..	..	1002-1008
Fibres	..	..	806-807	Other crops	..	..	1009-1010
Gums and resins	..	..	808	Noted	..	..	1011a-1011g
Herbs and condiments	..	..	809-810	TROPICAL FRUIT AND PLANTATION CROPS			
Hops	..	..	811-816		Abstr. 175.	Noted 22	1012-1187v
Insecticidal plants	..	..	817-819	General	..	..	1012-1020
Rubber plants	..	..	820-829	Bananas	..	..	1021-1023
Tannins	..	..	830	Cacao	..	..	1024-1033
Vegetable oils	..	..	831-833	Cloves	..	..	1034
Other crops	..	..	834-835	Coconuts	..	..	1035-1042
Noted	..	..	836a-836o	Coffee	..	..	1043-1067
FLORICULTURE				Hard fibres	..	..	1068-1069
	Abstr. 90.	Noted 25	837-927y	Mangoes	..	..	1070-1077
General	..	..	837-843	Oil palms	..	..	1078-1081
Annuals and herbaceous plants	..	..	844-869	Pineapples	..	..	1082
Bulbs, tubers, etc.	..	..	870-889	Rubber trees	..	..	1083-1094
Cacti and succulents	..	..	890-891	Sugar cane	..	..	1095-1170
Orchids	..	..	892-894	Tea	..	..	1171-1181
Roses	..	..	895-902	Other crops	..	..	1182-1186
Shrubs and trees	..	..	903-925	Noted	..	..	1187a-1187v
Lawns	..	..	926	NOTES ON BOOKS AND REPORTS			
Noted	..	..	927a-927y		Abstr. 56.	Noted 9	1188-1244i
SUB-TROPICAL FRUIT AND PLANTATION				Books	..	..	1188-1209
CROPS	Abstr. 83.	Noted 7	928-1011g	Reports	..	..	1210-1242
General	..	..	928-929	New periodicals	..	..	1243
Avocados	..	..	930-934	Noted	..	..	1244a-1244i
Citrus	..	..	935-996	Total Abstracts 1230. Noted 250.			
Eucalyptus	..	..	997-999				

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

## MISCELLANEOUS.

### General.

#### 1. LANJOUW, J. (editor).

##### Botanical nomenclature and taxonomy.

*Chron. Bot.*, 1950, 12: 1-88, illus.

The sub-title of this work reads: "A symposium organized by the International Union of Biological Sciences with support of UNESCO at Utrecht, the Netherlands, June 14-19, 1948. With a supplement to the International Rules of Botanical Nomenclature, embodying the alterations made at the Sixth International Botanical Congress, Amsterdam, 1935, compiled by T. A. Sprague, D.Sc., Rapporteur général."

#### 2. UNIVERSITY OF BRISTOL (BUTTERFIELD, H.C.).

##### Diploma in Horticultural Science.

[*Publ.*] *Univ. Bristol*, 1950, pp. 4.

A post-graduate course leading to a Diploma in Horticultural Science has been instituted in the University of Bristol. The course will extend over four terms and may be followed by an optional course lasting two terms in either Pomology, Entomology or Mycology, which will lead to a Certificate in the subject chosen.

#### 3. CRANE, M. B.

##### Masters Memorial Lectures, 1950. The origin and improvement of cultivated plants. Parts I and II.

*J. roy. hort. Soc.*, 1950, 75: 427-35, 465-74, bibl. 19, illus.

The author discusses first the four modes of origin of our races of cultivated plants, viz. (1) gene mutations, (2) auto-polyploidy, (3) interspecific hybridization, (4) hybrid-polyploids. He then continues with an account of further aspects of plant breeding, (a) the induction of polyploidy, with particular reference to the use of colchicine, (b) the action of genes, (c) hybrid vigour, and (d) plant improvement, by deliberate breeding with special objects in view, particularly the raising of races of plants which are immune or highly resistant to specific diseases. Many examples of fruit and ornamental plants are mentioned to illustrate the various points raised.

#### 4. ŠEFTELJ, I. M.

##### The Nikitskii garden—a green treasure house of the U.S.S.R. [Russian.]

*Priroda* (Nature), 1950, No. 8, pp. 90-5, illus.

A description of the Molotov botanic garden at Nikita on the shores of the Black Sea near Yalta. On its 260 hectares are about 7,000 species, varieties, forms and selections of cultivated and ornamental plants grown for scientific investigations. A table shows the number of species and varieties of temperate and sub-tropical fruits, ornamentals and technological plants.



5. VAN ONSEM, R., AND STEELANT, L.  
Les applications de l'électricité en horticulture. (The application of electricity in horticulture.)  
*Rev. Agric. Brux.*, 1950, 3: 17-64, bibl. 27, illus.

A detailed review is given of the subject, covering the theoretical and practical aspects of soil heating, soil sterilization, glasshouse heating and glasshouse illumination, the latter with special reference to photosynthesis, respiration and photoperiodism and to the application of the technique to seedlings, cuttings and older plants. The bibliography consists of references to 20 review articles and 7 books.

6. DE FINA, A. L., AND GARBOSKY, A. J.  
Cálculos, clave y notación a usar en el método de reconocimiento de la aptitud agroecológica basado en cultivos índices. (A method for determining the suitability of a district for the culture of new crops, based on the use of indicator plants.)  
*Rev. Invest. agric. B. Aires*, 1949, 3: 277-302, illus.

In 1945 the Institute of Soils and Agrotechnology, Buenos Aires, published an account of a simple and rapid method of determining the suitability of any district for the culture of crops new to that district. The method was based on observations of the performance (or the absence) of a series of 18 indicator plants. In the present paper an improvement on this method is presented which eliminates the personal factor involved in the interpretation of the observations made.

7. BLANCHARD, L. E.  
Plant reactions to chemical and physical changes.  
*J. roy. hort. Soc.*, 1950, 75: 390-6, bibl. 3.

A discussion of the reaction of plants to changes in their natural balance caused by cultural measures such as pruning, transplanting and fertilizing.

#### Statistical design.

8. YATES, F.  
Agriculture, sampling and operational research.  
[*Publ.*] *Rothamsted Exp. Stat.*, undated, pp. 8, bibl. 4.

Operational research is defined as "the application of the methods of scientific research to problems arising in administration and planning". Two agricultural examples from Great Britain are described: (i) During 1940 it became important to balance the difficulty of importing fertilizers against the benefits to be derived from them and also to decide which crops most needed them. (ii) Reasons were sought why the total yield of potatoes is low in relation to the area planted and the crops obtained by good growers. S.C.P.

9. WILCOX, J. C.  
Use of the survey method in horticultural research.

*Sci. Agric.*, 1950, 30: 137-49, bibl. 14, being *Contr. Div. Hort., Dep. Agric. Ottawa*, 727. Many research investigations can be carried out by a

survey of existing commercial orchards as well as by a field trial. The relative advantages of the two approaches are dealt with in a very comprehensive manner. S.C.P.

10. SHAH, S. M. I.  
Influence of the number of trees per plot on the precision of peach yield trials.  
*Punjab Fruit J.*, 1950, 14: 17-22, bibl. 5.

By taking the individual yields of 112 trees during three years and calculating the coefficient of variability of plots of 1, 2, 4, 6 and 8 trees, it is concluded that the optimum number of trees is 4 and the best arrangement is a linear one. C.W.S.H.

#### Meteorology.

(See also 1244c.)

11. DEUTSCHER WETTERDIENST.  
Zweck und Ziel des Phänologischen Dienstes. (The function of the Phenological Service in Germany.)  
*Mitt. dtsh. Wetterdienst. U.S. Zone* 1, 1948, pp. 12, bibl. 16, illus. [received 1950].

In 1936 the phenological service was established on a large scale as a branch of the German meteorological service, the number of observers at the outbreak of the war amounting to 10,000. The service was re-organized after the war within the 4 zones of occupation, with Bad Kissingen as the headquarters for the American zone. Observations in each place extend to (a) wild plants, (b) agricultural crops and (c) fruit and vines, the results being combined on one report sheet. The scheme is of value to the fruit grower, as the data are recorded separately for different varieties. This helps him to choose suitable varieties for his site and the right pollinators for his varieties as well as to plan his spraying programme. The maps reproduced include one showing the beginning of apple blossoming all over Germany in 1936. Phenological data relating to apple, lilac, elder and snowdrop flowering, bud burst and autumn colouring are tabulated, some of them for the period 1867-1947.

12. KREUTZ, W.  
Spezielle agrarmeteorologische Aufgaben des Versuchsfeldes Heidelberg-Grenzshof und ihre praktische Zielsetzung. (The special agro-meteorological problems and practical aims pursued at the experimental field station, Heidelberg-Grenzshof.)  
*Ber. dtsh. Wetterdienst. U.S. Zone*, 1949, No. 12, pp. 202-9, illus.

The following problems are being investigated at the Heidelberg-Grenzshof station, which was established in 1949 on a 3-ha. field: (i) Temperature and moisture measurements, to a depth of 1 m., in uncultivated, cultivated and cropped soils. This line of study includes frost penetration, the rate of warming up in spring and of drying out during a drought. (ii) Methods of improving climatic conditions in local areas by windbreaks (see below) and irrigation. (iii) Observations on the micro-climate in clamps. (iv) The relationship between weather and pest and disease incidence, with special reference to the hibernation of Colorado beetle in the soil. (v) Climate inside farm buildings. (vi) Glasshouse climate in relation to



weather. Experiments carried out on dwarf beans are described in some detail: (1) *The effect of hoeing*. The following 3 treatments were compared: (a) No hoeing, (b) hoeing once, and (c) hoeing after every rain. Hoeing was found to affect heat conduction, the soil in the hoed plots being warmer in the morning and cooler under the influence of direct radiation. Treatments (b) and (c) doubled and trebled yields respectively, as compared with (a). [Weed growth is not discussed.] (2) *The effect of windbreaks*. Strips of maize were grown alongside plots of dwarf beans, and reed mats were put up across the plots, 18 m. apart. Photographs illustrate the effect of the mats on air currents, made visible by smoke, and diagrams record their influence on wind velocity, dew formation, air temperature, and evaporation. Owing to a reduction in the latter the soil in the sheltered zone was distinctly moister and less liable to form a crust. Where hoeing was repeated after every rain, windbreaks increased yields by 57-4%. Other photographs show the layout of the field and the instruments used.

### 13. SCHNELLE, F.

Wetterkundlicher Wegweiser für Landwirte, Obstbauer, Gärtner, Winzer und Meteorologen. (Meteorological advice for farmers, fruitgrowers, market gardeners, vine growers and meteorologists.)

Mitt. dtsh. Wetterdienst. U.S. Zone 3, 1949, pp. 36, bibl. 14, illus.

The advisory activity of the German meteorological service for farmers includes forecasts relating to the covering of clamps and the ventilation of clamps and storage cellars; the protection of fruit trees from solar radiation injury after a severe frost; favourable periods for the application of winter washes; the planting of early potatoes; the protection of fruit trees and other susceptible crops against spring frosts; the planting of market garden crops; weed control; pest and disease control; irrigation; and the harvesting of fruit and vegetable crops before the onset of autumnal frosts. One of the maps shows the beginning of apple blossoming in Germany for the period 1936-44. A phenological calendar is appended.

### 14. DEUTSCHER WETTERDIENST.

Der heisse und trockene Sommer 1947. (The hot and dry summer of 1947.)

Ber. dtsh. Wetterdienst. U.S. Zone, 1949, No. 7, pp. 1-55, bibl. 38, illus.

About one-half of this report is devoted to the presentation and discussion of agro-meteorological data, for instance on soil temperatures as affected by type of soil, on the water balance of the soil, and on the effect of the drought on cultivated plants, among them potatoes. Finally the phenological data for 1947 are compared with the mean values for Germany over a long period.

### 15. WEISE, R.

Über die Rebe als Klima-Kriterium. (The vine as an indicator for climate.)

Ber. dtsh. Wetterdienst. U.S. Zone, 1949, No. 12, pp. 121-4.

The yield, but not the quality, of wine may be used as a guide to the climate of both small areas and large regions in any particular year and over longer periods.

### 16. BURGOS, J. J., AND DE FINA, A. L.

La lluvia artificial. (Artificial rain.)

Idia, 1948, 1: 9: 1-4, illus. [received 1950].

A review of the work that has been done in America on inducing precipitation by the artificial "seeding" of clouds. Although, in some cases, seeding with dry ice or silver iodide has successfully induced rain or snowfall, it is not yet a practical proposition. Moreover, the practice is unlikely to find application in arid regions, as the necessary atmospheric conditions rarely obtain in such districts.

### Biochemistry.

(See also 587, 1189.)

### 17. ROBINSON, A. R., NEWMAN, K. J., AND SCHOEB, E. J.

Mineral analysis of biological material by flame spectroscopy. Apparatus and application.

Analyt. Chem., 1950, 22: 1026-8, bibl. 11.

The construction is described of an inexpensive, simple burner with an all-plastic atomizer and glass chamber similar to those described by Griggs. With the use of a Bausch & Lomb medium quartz spectrograph 15 elements can be determined directly or upon the dissolved ash of biological materials with an accuracy of  $\pm 5\%$ . [Authors' abstract.]—Res. Lab., Children's Fund of Michigan, Detroit, Mich.

### 18. SHIRLEY, R. L., AND BENNE, E. J.

Report on sodium in plants.

J. Ass. off. agric. Chem. Wash., 1950, 33: 805-10.

The magnesium uranyl acetate method of analysis is recommended provisionally for adoption, but the study of methods for determining sodium in plant materials is to be continued.

### 19. BEESON, K. C., AND GREGORY, R. L.

Report on copper and cobalt in plants.

J. Ass. off. agric. Chem. Wash., 1950, 33: 819-27, bibl. 5.

It is recommended "that comparative analyses using both the nitrosocresol method and the nitroso-R-salt method be studied collaboratively with the objective of selecting the method most suited to routine work" and "that collaborative work on the carbamate method for copper be continued and extended".

### 20. BENNE, E. J., AND JOHNSTON, B. R.

Report on carotene and zinc in plant tissue.

J. Ass. off. agric. Chem. Wash., 1950, 33: 828-30, bibl. 9.

Two methods are recommended provisionally for adoption for the determination of carotene and zinc in plant tissues. The study of both problems is to be continued.

### 21. WILLIAMS, K. T., BEVENUE, A., AND POTTER, E. F.

Report on sugars in plants.

J. Ass. off. agric. Chem. Wash., 1950, 33: 816-18, bibl. 10.

The Hassid ferricyanide method of sugar analysis is recommended for further study. Various ion-exchange resins should be investigated to determine their value in clarifying plant extracts for sugar analysis.



22. NORDAL, A., AND KLEVSTRAND, R.

**Colorimetric determination of sedoheptulose.**

*Analyt. chim. Acta*, 1950, 4: 411-21, bibl. 23.

Sedoheptulose (*d*-altro-*d*-fructo-heptose) is widely distributed in plants of the family Crassulaceae, and appears to play an important part in the metabolism of these plants. Physiological investigations, however, have been hampered to some extent by lack of adequate methods of quantitative analysis for this heptose. The authors here present a method for colorimetric determination of sedoheptulose, based on the reaction with orcinol and hydrochloric acid.

23. WILLIAMS, K. T., MCCOMB, E. A., AND POTTER, E. F.

**Determination of levulose in fruit. Polarographic method.**

*Analyt. Chem.*, 1950, 22: 1031-3, bibl. 13.

A polarographic procedure for the determination of levulose in fruit is described. The sugars are extracted and prepared for measurement by conventional methods. The dextrose and sucrose present do not interfere, and concentrations of levulose varying from 0.05 to 2.0 mg. per ml. are suitable for measurement. Ion exchange resins are used to control pH. [Authors' abstract.]—Western Regional Res. Lab., Albany, Calif.

24. BOOTH, V. H.

**Recent advances in estimation of vitamins A.**

*Research, Lond.*, 1950, 3: 497-504, bibl. 91.

The chemical and biological methods of assay in use to-day have been evolved in countless small steps by numerous workers. Some of the more recent steps are discussed.

25. SAPOŽNIKOV, D. I.

**Photoreduction of silver nitrate by natural chlorophyll (phytochromoprotein plastids).**

[Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 561-4, bibl. 4 [received 1950].

Phytochromoprotein plastids obtained from aspidistra leaves effect photoreduction of silver nitrate. This is brought about by the conversion of carotene to xanthophyll.

26. KARA-MURZA, L. H.

**Tannins in virus-infected plants.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 301-4, bibl. 22 [received 1950].

A study of the tannin content of foliage of healthy and virus-infected plants of cotton (leaf-roll), lilac (leaf-roll), tomato (big bud), tobacco (mosaic). The leaves of diseased plants, particularly the first three, contained more tannins than those of healthy plants.

*Physiology.*

(See also 618, 731, 868.)

27. BLACKMAN, G. E., AND RUTTER, A. J.

**Physiological and ecological studies in the analysis of plant environment. V.\* An assessment of the factors controlling the distribution of the bluebell (*Scilla non-scripta*) in different communities.**

*Ann. Bot. Lond.*, 1950, 14: 487-520, bibl. 19.

The necessary conditions for the successful growth of the bluebell in grassland communities are: (i) the soil should remain moist in the spring but the drainage must be good; (ii) the mineral nutrient status of the soils should be low; (iii) the dominant grasses should combine a relatively prostrate habit with the characteristic of starting growth late in the spring; and (iv) the sward should not be grazed until after the flowering of *S. non-scripta*. The bluebell will compete with *Pteridium aquilinum* outside woodland, because much of the seasonal growth is made in the high-light phase before the bracken fronds expand; moreover, bracken tends to exclude other competitive species, and dense bracken is associated with the absence of heavy grazing. *S. non-scripta* will grow in exposed situations (e.g. rock ledges) provided the moisture is adequate. The prevalence of the bluebell in deciduous woods is attributed to the absence of aggressively competitive species and more particularly to the absence of grazing animals.

28. MALYŠEV, A. A.

**The rhythm of development of plants and experiments on transplanting them to different mountain zones.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 63: 753-6, bibl. 4 [received 1950].

An account, with data, of the differences in rate of development of native and cultivated plants when grown at different altitudes.

29. PETERSON, J. B.

**Relations of soil air to roots as factors in plant growth.**

*Soil Sci.*, 1950, 70: 175-85, bibl. 55.

A review of the subject discussed under: effect of aeration on crop response; physiological effects of soil oxygen; oxygen requirements of plants; harmful influence of excessive CO<sub>2</sub>; avoiding poor aeration through soil management.—Purdue Univ. agric. Exp. Stat.

30. KOLOBKOVA, E. V.

**Proteolytic enzymes in leaves of plants separated phylogenetically.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 107-9, bibl. 4.

In relation to the conception that plants of a phylogenetically young group have a higher energy potential than plants of an older group, an examination was made of species of the families Leguminosae, Ranunculaceae and Rosaceae. It was found that protease activity in the leguminous plants was at a higher level than in those of the older Ranunculaceae. Data for rosaceous plants were not obtained, for the proteolytic enzymes of the leaves in plants investigated (*Rosa* sp., *Pyrus malus*, *Potentilla* sp., etc.) showed no activity under the conditions of the experiments.

31. KUDRJAŠOVA, N. A.

**The catalase in leaves of plants of the families Leguminosae, Rosaceae and Ranunculaceae.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 111-4, bibl. 5.

\* For parts I, II, III and IV, see *Ibid.*, 1946, 10: 361; 1947, 11: 26 (*H.A.*, 17: 1133); 1948, 12: 1 (*H.A.*, 18: 806); and 1949, 13: 453 (*H.A.*, 19: 2660).



In the plants examined the nitrogen content and catalase activity were highest in species of Leguminosae, lower in Ranunculaceae, and lowest in Rosaceae.

32. SISAKJAN, N. M., AND ČAMOVA, K. G.  
**The dehydrases of plastids.** [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1949, **67**:  
337-40, bibl. 10.

A biochemical study of the activity of dehydrases in chloroplasts, leucoplasts and chromoplasts from various plants, including bean, potato, cabbage and carrot.

33. GENKELJ, P. A., AND OKNINA, E. Z.  
**Dormancy in plants.** [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, **62**:  
409-12, bibl. 10, illus. [received 1950].

From a study of dormancy in a number of plants the author recognizes two processes which he names embryogenic and protoplasm separation. The embryogenic process is one of cell division, dormancy being often necessary for this to take place normally. In the "separation" process the protoplasm contracts from the cell walls and there is then discontinuity of the protoplasm of neighbouring cells. Certain fruit trees and bushes (apple, pear, vine) showed an outstanding degree of protoplasm separation. Some plants easily damaged by frost (e.g. some varieties of walnut) do not show protoplasm separation. Other plants which are not resistant to frost quickly show protoplasm separation but the process is easily reversed on thawing, and, finally, resistant plants show the separation process relatively late but it persists throughout the winter. The protoplasm separation process is associated with the deposition of a lipid layer on the surface of the protoplasm and also, apparently, on the wall of the vacuole.

34. OKNINA, E. Z.  
**Plasmodesmata in resting plant cells.** [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, **62**:  
705-8, bibl. 13 [received 1950].

When plants go into a state of rest the protoplasts contract from the cell walls and the plasmodesmata cannot be seen. When the plants come out of rest the protoplasts swell, the plasmodesmata redevelop, and connexion between the protoplasts of neighbouring cells is resumed.

35. SATAROVA, N. A.  
**Some characteristics of plant cells when in a condition of summer rest.** [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, **62**:  
713-16, bibl. 17, illus. [received 1950].

During the summer resting period (2 to 3 months after harvest) it was found that the protoplasm of cells in potato tubers and in rubber-bearing roots of kok saghyz, tau saghyz and krym saghyz undergoes contraction from the cell walls, as in the winter rest period [see abstract 34]. When coming out of the rest period, either normally or, in the case of potato tubers, when treated with auxins to hasten the process, the protoplasm absorbs water and swells up, and the protoplasmic continuity of neighbouring cells is resumed.

36. LEE, A. E.  
**The growth in culture of intact seedlings and isolated seedling organs.**  
*Amer. J. Bot.*, 1950, **37**: 312-18, bibl. 16, illus.

Techniques are presented for the culture under one set of controlled conditions of intact tomato seedlings and isolated seedling organs. The sum of the growth of isolated parts which would make up an entire plant approximates to that of an intact plant, but the relative growth values (final weight divided by initial weight) of individual organs differ, according to whether they are on an intact plant or are isolated. Growth values are higher for plants or individual organs with a low initial weight than for those with a high one. Isolated cotyledons show higher, and isolated stems and roots lower, growth values than the same organs on intact plants. Factors which may be responsible for these growth differences are discussed.—Plant Res. Inst., Austin, Texas.

37. AVAKAN, A. A.  
**The flowering of biennials in their first year of growth.** [Russian.]  
*Agrobiologija* (Agrobiology), 1950, No. 2,  
pp. 12-21, illus.

The vernalization of biennials in their young stage of growth, and under low temperatures, can be attained by grafting them on older plants. In such cases a store of organic substances is made available which contributes to the rapid completion of the vernalization stage. Biennials (e.g. cabbage, carrot), after being grafted on annuals, flower in their first year.

38. SEMPIO, C.  
**Metabolic resistance to plant diseases.**  
*Phytopathology*, 1950, **40**: 799-819, bibl. 28, illus.

The conception of "metabolic resistance" is explained, and the mechanisms through which it appears to operate are indicated. Experimental data are tabulated for two varieties of wheat in relation to infection by *Oidium monilioides*, and reference is made to lettuce plants infected with *Bremia lactucae*.—Istituto di Fisiopatologia vegetale, Facoltà di Agraria, Università, Perugia, Italy.

39. HOLODNYI, N. G.  
**On the physiological effect of volatile organic substances on plants.** [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, **62**:  
825-7, bibl. 3 [received 1950].

The author refers to his previous work where he claims that certain volatile organic substances may be assimilated by micro-organisms and that such substances have a favourable effect on the growth and viability of cut pieces of roots. In the work described in the present paper he used root pieces of maize, pea, and blue lupin, treated with the ethereal emanations from formic acid and acetic acid (the latter only on lupin). He concludes that the results show that the roots of various plants are able to take in from the air volatile organic compounds and to utilize them in their metabolism. An important part in this process is probably played by the bacteria of the rhizosphere.



## 40. SIEGEL, S. M.

Effects of exposures of seeds to various physical agents. I. Effects of brief exposures to heat and cold on germination and light-sensitivity.

*Bot. Gaz.*, 1950, 112: 57-70, bibl. 13, being *Contr. Hull bot. Lab.* 615.

Seeds of several species including crabgrass, beans, radishes and maize were subjected to conditioning at various temperatures for brief periods and the effects of such conditioning on light-sensitivity, enzyme activity and, in some cases, on subsequent growth were studied. Many instances were observed in which temperature conditioning acting alone or with light promoted more germination than in control groups. This is discussed in terms of increased chemical activity, the possible effects of light on enzyme activity, and the generally observed stimulatory effect of sudden changes in temperature. In all cases a combination of high water content and high conditioning temperature was deleterious to germination. The upper limit of heat tolerance for seeds of a number of species heated dry is less than 135° C. for 15 minutes. The most resistant species studied was wheat, followed by flax and radish. The relative insensitivity of flax and radish may be related to the high oil content of these seeds. Light was found inhibitory to these two species after heat treatment, while it made little or no difference to the germination of maize and bean. Any interpretation of the results reported must be of a tentative nature owing to the physical, chemical and morphological heterogeneity of the seed.—Camp Detrick, Frederick, Md.

## 41. MANNING, H. E.

The effect of anthocyanin filters on plant behavior and development.

*Butler Univ. bot. Stud.*, 1950, 9: 203-11, bibl. 16, illus.

Experiments were conducted with filters made of anthocyanin from beets (antho-red) to determine their effect on growing beans. Red light from an anthocyanin filter and red light from a red glass filter produced similar effects on plant behaviour and development. Beans exposed to red light for 30 days produced heavier plants than controls although the leaf surface was reduced one-third in area. Red light induced most striking modifications in leaf size and structure. A 7-day exposure to red light after sprouting, followed by growth in white light, was best for development of stem diameter and length, number and area of leaves, weight of pods and total weight of plants. All exposures to red light (7, 14, 30 days) reduced root development.

## 42. MOŠKOV, B. S.

Raising plants under artificial illumination. [Russian.]

*Agrobiologija* (Agrobiology), 1950, No. 2, pp. 66-74, bibl. 3.

A discussion on artificial illumination of plants, with particular reference to the effect of the radiant energy emitted from different parts of the spectrum and to the intensity of illumination. Data are tabulated to show the effects of red-orange, yellow-green, and blue-violet radiation on tomato. The plants were least drawn but had the highest dry weight under yellow-green light. The dry weight of tomato plants increased from 0.5 to

2.6 g. as the intensity of illumination was raised from 200,000 to 800,000 ergs.

## 43. YAMANE, G.

Untersuchungen über eine transversalphototropische Bewegung der Laubblätter von *Fatsia japonica* gegen das von vorn einfallende Licht. (The transversal phototropism of the foliage leaves of *Fatsia japonica*.)

*Jap. J. Bot.*, 1944, 13: 435-61, bibl. 60 [received 1950].

The transversal phototropic reaction of horizontal *Fatsia* leaves to diffuse light coming in through the window is discussed with special reference to the growth substance theory. The lamina reaches the transversal phototropic position by a downward movement of the leaf when the tip is turned towards the light and by an upward movement when the base is turned to the light.

## 44. ZIEGLER, H.

Inversion phototropischer Reaktionen. (The inversion of phototropic reactions.)

*Planta*, 1950, 38: 474-98, bibl. 30.

Inversion of the phototropic reaction in the hypocotyl of dicotyledons and the *Avena* coleoptile was induced (a) by illumination under liquid paraffin and (b) by one-sided illumination under a solution of certain dyestuffs. Method (b) also induced a positive phototropic curvature in roots which are normally phototropically indifferent or react negatively.—Munich University.

## 45. EHRENBERG, M.

Beziehungen zwischen Fermenttätigkeit und Blattbewegung bei *Phaseolus multiflorus* unter verschiedenen photoperiodischen Bedingungen. (The relationship between enzyme activity and leaf movement in *P. multiflorus* under conditions of varying photoperiods.)

*Planta*, 1950, 38: 244-79, bibl. numerous.

(1) The investigation on enzyme activity, which was carried out on primary leaves of decapitated *P. multiflorus* plants, has yielded the following results, the enzymes studied being phosphatase and to a lesser extent amylase: (a) Different leaves, even of the same plant, showed a different degree of enzyme activity; (b) in asymmetrical leaves enzyme activity was less in the less developed half, while (c) in all leaves the content of active enzyme was higher at the base than at the tip. (2) Daily curves of enzyme activity (using halves of completely symmetrical leaves) were obtained under 3 different conditions of light-darkness rhythm: (a) The daily curve found for a light-darkness ratio of 9:15 hours reached a maximum 9 hours, and a minimum 21 hours, after the beginning of illumination; hence, it had a 12:12 hourly rhythm. (b) With a light-darkness ratio of 1:23 hours enzyme activity showed the same 12:12 hourly rhythm. (c) With a light-darkness ratio of 6:6 hours the enzyme activity rose and fell in the same rhythm, which means that it decreased during the second 6-hour period of illumination. (3) With two 24-hour periods of light-darkness change a relationship was found to exist between the enzyme curve and the curve of leaf movement. With



the 6:6 hour light-darkness ratio this relationship was disturbed by the external stimulus acting against the internal rhythm, which at times caused a leaf movement contrary to the endogenic rhythm.—Göttingen University.

46. ŽDANOVA, L. P.

**Analysing the change of fruiting branches to a vegetative condition due to alteration in photoperiodic conditions.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1421-4, bibl. 5 [received 1950].

The experiments recorded were on *Perilla ocymoides* and *P. nankinensis*, short-day plants, and on *Rudbeckia bicolor* and *R. hirta*, long-day plants. In the course of photoperiodic induction, flower-inducing hormones form and accumulate in the leaves. These enter the growing points of the branches and are expended in those reactions which result in the inception of the generative organs. A change from fruiting to vegetative conditions is a morphological expression of the change in the plant contents corresponding to a marked diminution in the quantity of the flower-inducing hormones entering the growing point from the leaves.

47. SAMYGIN, G. A.

**The effect of light intensity in photoperiods unfavourable to the development of rudbeckia and perilla.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1433-6, bibl. 11 [received 1950].

It was found that the nature of the light reactions during unfavourable light periods in *Rudbeckia bicolor* and *Perilla nankinensis*, checking development, are different: in *rudbeckia* they depend largely on the intensity of the light, while in *perilla* there is no such dependence.

48. ČAĬLAHAN, M. H., AND RUPČEVA, I. A.

**The effect of interrupted illumination on the generative development of plants.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 565-8, bibl. 12, illus. [received 1950].

Experiments are described using the long-day plants *Rudbeckia bicolor*, *Anethum graveolens* (dill), and *Avena sativa* (oat, variety Pobeda), and the short-day plants *Perilla nankinensis*, *P. ocymoides*, *Chrysanthemum indicum* and *Cosmos bipinnatus*. Interrupted illumination applied supplementary to a period of uninterrupted illumination had the same effect as uninterrupted illumination on both long-day and short-day plants. Interrupted illumination applied as the basic source of light affected short-day plants, not as uninterrupted illumination, but as the sum of the hours of interrupted illumination.

49. RUPČEVA, I. A.

**The development of plants under conditions of intermittent photoperiodic cycles.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 62: 271-4, bibl. 9 [received 1950].

In certain short-day plants (*chrysanthemum*, *perilla*), reactions beginning in short days did not cease under conditions of complete darkness. In some long-day plants (e.g. *Anethum graveolens*) the reactions induced by long-day treatment ceased in darkness, but could be

summed up. In other long-day plants intermittent darkness caused distinct retardation of development.

50. ČAĬLAHAN, M. H., AND ŽDANOVA, L. P.

**The effect of temperature on the photoperiodism of plants.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 62: 549-52, bibl. 18 [received 1950].

Experiments were carried out with *Perilla nankinensis* (short-day), and *Spinacia oleracea* and *Anethum graveolens* (long-day plants). Results obtained indicate that in both groups of plants there are, besides the photochemical reactions, two types of chemical reaction, one accompanying the photochemical reaction and acting in light and in darkness, and the other acting only in darkness. The significance of these two types of reaction is different for long-day and short-day plants. In long-day plants these chemical reactions show finality, but in short-day species they are intermediate for the completion of the photoperiodic process. The chemical reactions which operate in darkness interrupt, in long-day species, and complete, in short-day species, the process necessary for generative reproduction.

51. AIZENŠTAT, JA. S.

**The effect of short-day illumination in changing dominance.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1950, 70: 97-100, bibl. 1, illus.

It is concluded that the cultivation of tomato plants under very much shortened daylight reduced their general physiological activity, that this lowered vitality was transmitted to the progeny, and that it resulted in a reduction of the persistence of certain inheritable characters.

### Water relations.

(See also 1197.)

52. PRESTON, R. D.

**Mechanism of movement of solutions in plants.**

*Discussions Faraday Soc.*, 1948, No. 3, pp. 130-3, bibl. 16 [received 1950].

Outlines the various problems involved in describing the movement of solutions in plants, and the various theories invoked to simplify these problems, and enumerates the centres of interest around which modern physiological work in this field is gathered.

F.W.M.L.

53. BENNET-CLARK, T. A.

**Non-osmotic water movement in plant cells.**

*Discussions Faraday Soc.*, 1948, No. 3, pp. 134-9, bibl. 12 [received 1950].

The author presents data showing that the classical theories of osmosis do not account for the behaviour of water flowing through cell membranes, and that the hydrostatic pressure within the cell is greater than would be expected on osmotic grounds. The energy required for the maintenance of this pressure—given normal values for the permeability of the cell wall—appears to be too great to be supplied by the normal respiration of the cell, and adequate discussion must await a more complete theory of diffusion through oil-films.

F.W.M.L.

## 54. LUNDEGÅRDH, H.

On the mechanism of active movement of water and solutes through plant roots.

*Discussions Faraday Soc.*, 1948, No. 3, pp. 139-46, bibl. 10, illus. [received 1950].

The many problems involved in the phenomenon of bleeding of cut roots are discussed. The water pressure is provisionally ascribed to the result of an osmotic system. The exudation of salts is a passive process (i.e. one not requiring a source of energy) but their uptake is active. Experiments involving cutting off varying lengths of the root tip and following the changes in bleeding show that the cortex plays a significant part in maintaining the pressure, and further experiments with  $\beta$ -indoleacetic acid and malonic acid indicate that active sap movement is regulated by aerobic respiration of the cells, but that the actual release of the sap is an anaerobic process dependent on the supply of osmotic material derived from aerobic respiration.

F.W.M.L.

## 55. VAN DEN HONERT, T. H.

Water transport in plants as a catenary process.

*Discussions Faraday Soc.*, 1948, No. 3, pp. 146-53, bibl. 21 [received 1950].

The author stresses the need to examine the interaction of all parts of the soil, plant and air through which water is moving. He puts forward the view that these interactions are best analysed by analogy with Ohm's Law, and that the change in resistance to flow of water in any one component of the system must be compared with the total resistance of the system, rather than with its original value, in order to determine the effect of the change on the rate of flow of the water. He thus shows that the stomata are, in theory, ideally situated to control the rate of flow of water through the plant from soil to air.

F.W.M.L.

## 56. CRAFTS, A. S.

Movement of materials in phloem as influenced by the porous nature of the tissues.

*Discussions Faraday Soc.*, 1948, No. 3, pp. 153-9, bibl. 13 [received 1950].

The author examines "in the light of modern physical chemistry, the resistance of cross walls of the phloem, and the effects of sieve-tube ontogeny on the permeability of the cytoplasm". He concludes that the more highly hydrated ends of the cellulose walls of the sieve tubes have a material effect in increasing their permeability to plasmolysing solutions.

F.W.M.L.

## 57. LEWIS, F. J.

Water movement in leaves.

*Discussions Faraday Soc.*, 1948, No. 3, pp. 159-62, bibl. 1 [received 1950].

This paper describes experiments on the properties of the mesophyll surface of the leaves of a number of plants, demonstrating the hydrophobic nature of the surface and the ability of sodium taurocholate solution to destroy this property. Experiments with the adsorption of dyes show only basic dyes to be adsorbed. Evidence for the active secretion of water is deduced from the observed development of globules of water on the surface even when that surface is covered by a continuous layer of paraffin preventing evaporation.

F.W.M.L.

## 58. GUPALO, P. I.

The water content of leaves in relation to the dynamics of ontogenetic development of plants.

*Doklady Akad. Nauk S.S.S.R.*, 1949, 67: 389-92, bibl. 18.

In experiments with potato, beet, carrot, and radish it was found that the upper leaves contained less water (in relation to dry weight) than the lower, older ones and it is concluded that under comparable environments the water content (% water to dry weight) of leaves of cultivated plants is an indicator characterizing the dynamics of ontogenetic development. It is concluded that the determination of the relative water content at corresponding levels on the stems can be used as an indicator of the physiological condition of the plant in relation to its age and development under comparable conditions.

## 59. FOGG, G. E.

Adhesion of water to the external surfaces of leaves.

*Discussions Faraday Soc.*, 1948, No. 3, pp. 162-6, bibl. 13 [received 1950].

The advancing contact angle of water on the exterior surface of a leaf provides a convenient measure of the adhesion between the two. The true contact angle on the surface of the cuticle appears to be largely determined by films of hydrophobic or hydrophilic substances although the adhesion of water to its principal component, cutin, is of an intermediate magnitude. Observed contact angles differ from true contact angles according to the extent of corrugation of a leaf surface. Expressions connecting the two for rough and porous surfaces are respectively applicable in the cases where the leaf surface is completely covered by water and where air films are retained beneath the drops. The extent of corrugation of a leaf surface alters with the water relations of the tissues beneath, observed contact angles showing corresponding changes. [Author's summary.]

## 60. KRAMER, P. J.

Effects of wilting on the subsequent intake of water by plants.

*Amer. J. Bot.*, 1950, 37: 280-4, bibl. 11.

The transpiration of wilted tomato and sunflower plants was reduced to 10-40% of that of unwilted control plants, depending on the severity and length of time of wilting. The transpiration rates returned to 70% or 80% of normal 3 or 4 days after the soil had been rewetted. Roots of plants which had been wilted showed a large reduction in rate of water intake compared with the controls. The reduction was about 50% for plants wilted overnight and 80-90% for plants wilted for 4 days. Tomato plants wilted for 4 days and then kept watered for 4 days showed a high degree of recovery of water-absorbing capacity, but sunflowers given the same treatment showed little recovery. Water movement was reduced to about the same extent by wilting in sunflower, tobacco and tomato root systems. Some decrease in permeability of protoplasm is probably produced by wilting, but the reduced absorbing capacity of root systems of wilted plants is largely attributed to cessation of elongation and increased suberization.—Duke Univ., Durham, N.C.



## 61. PILARZ, J.

Zur Methodik der Wassergehaltsbestimmung von Saatgut. (The determination of water content in seeds.)

*Bodenkultur*, July 1950, 1st Sonderheft, pp. 32-4.

The methods discussed in this preliminary communication were applied to cereals and other agricultural seeds at the Vienna seed testing station.

### Growth substances.

(See also 198, 200, 202, 203, 207-211, 247, 288-290, 414, 442, 556, 580, 589, 642, 651, 666-670, 720, 766, 767, 772, 773, 869, 921, 964, 965, 1200.)

## 62. OKABE, Y.

On the distribution of growth-promoting and growth-inhibiting substances in *Morus alba* L. and *Cassia occidentalis* L. [Japanese, English summary.]

*Bot. Mag. Tokyo*, 1940, 54: 453-61, from abstr. in *Jap. J. Bot.*, 1941, 11: (111) [received 1950].

When the lower end of a section from the tip of a branch of *Morus alba* or *Cassia occidentalis* was in contact with an agar block, a negative curvature was induced in an avena coleoptile placed on the block, indicating that a growth-promoting substance had been diffused into the block. More mature wood, nearer the root, induced a positive curvature, indicating the predominance of a growth-inhibiting substance. The oldest portions of the plant induced the greatest positive curvature. In the case of the root, the central portion induced the greatest positive curvature. When the upper ends of the branch sections were in contact with the block, a positive curvature was induced. This confirms the theory that the growth-inhibiting substance can move either basipetally or acropetally in the stem, while the growth-promoting substance can move basipetally only.

## 63. OKABE, Y.

Growth-promoting and growth-inhibiting substances in the petiole. [Japanese, English summary.]

*Bot. Mag. Tokyo*, 1940, 54: 357-65, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (110-11) [received 1950].

The petioles of *Morus alba*, *M. bombycis*, *Cudrania triloba*, *Ficus carica*, *Thea sinensis*, *Salix viminalis* and *Ginkgo biloba* were placed on agar blocks to allow the growth substances present to diffuse out into the blocks. The nature of the growth substances was then determined by the avena method, and it was found that, in all cases, the young leaves contained growth-promoting substances and the mature leaves growth-inhibiting substances. The growth-promoting substance moved basipetally only, and the concentration in the petiole gradually decreased after removal of the leaf blade, while the growth-inhibiting substance moved in either direction and the concentration increased after removal of the leaf until the fall of the petiole.

## 64. FLEROV, A. F., AND FLEROV, V. A.

Raising plants from cotyledons separated from the embryos (cotylegenia). [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1437-9, bibl. 3 [received 1950].

Experiments were carried out with bean, pea, pumpkin, cucumber, and sunflower seeds, which were soaked in solutions (10 mg. %) of various growth substances and alkaloids for 24-48 hours, washed in water, and then the cotyledons removed and placed on moist filter paper in petri dishes. The cotyledons of the treated seed showed increased rooting and bud development over those of control seeds soaked in water only.

## 65. OKANENKO, A. S., AND TABENCKII, D. A.

The formative effect of 2,4-dichlorophenoxyacetic acid on beetroot. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 62: 541-4, illus. [received 1950].

Experiments in applying 2,4-D to beet seeds and seedlings. The seeds were immersed for 48 hours in a solution (concentration not stated), and the seedlings sprayed with a concentration of 50 p.p.m. (this is mentioned as being the most effective). The plants from treated seeds showed distinctly retarded growth at first, accompanied by anomalous development of the root tissues, hastening root formation and the growth of leaves. Spraying the seedling leaves caused the formation of tubers on the roots\* and an unusual leaf structure.

## 66. TAGEEVA, S. V., AND BROVEYNA, V. L.

The effect of growth substances on the absorption and expenditure of water by plant tissues. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1589-92, bibl. 8 [received 1950].

Experiments with the broad bean (*Vicia faba*) showed that spraying the above-ground organs with solutions of growth substances produced, in addition to the direct effect on growth, an increased intake of water by the leaves. The results suggest that the growth hormones are able to raise the intake of water by the plant cells during the whole life of the plant, and that the absorption of water by plants is closely connected with the presence of auxins in the tissues.

## 67. TORREY, J. G.

The induction of lateral roots by indoleacetic acid and root decapitation.

*Amer. J. Bot.*, 1950, 37: 257-64, bibl. 13.

Studies are described on the physiological process of lateral root formation and the part played by auxin in it, using sterile cultures of pea root tips. It is suggested that an unidentified substance other than auxin is necessary for lateral root formation in pea roots, but that the substance becomes active within the root under the influence of auxin. A balance between naturally produced auxin within the root and the lateral root-forming substance is suggested as the mechanism controlling normal lateral root formation in the intact plant.—University of California, Berkeley.

## 68. KOJIMA, H.

The effect of heteroauxin on extension growth and cell division in the root of *Pisum sativum*. [Japanese, German summary.]

*Bul. Sci. Fak. Terkult. Kyûsyû imp. Univ.*, 1940, 9: 18-20, from abstr. in *Jap. J. Bot.*, 1941, 11: (98) [received 1950].

A  $10^{-8}$  to  $10^{-9}$  M. solution of heteroauxin had no effect on the root growth of pea seedlings. A  $10^{-4}$  M.

solution, however, inhibited extension growth and increased cell division to such an extent that the roots developed a tumour-like appearance.

69. CHRISTIANSEN, G. S., AND THIMANN, K. V.  
The metabolism of stem tissue during growth and its inhibition. III.\* Nitrogen metabolism.

*Arch. Biochem.*, 1950, 28: 117-29, bibl. 16.

The nitrogen metabolism of isolated pea stem sections and the influence of indoleacetic acid and three enzyme inhibitors (arsenite, fluoride, and iodoacetate) on this metabolism have been studied. The principal changes taking place when sections are maintained in water are: (1) Consumption of free amino acids, (2) synthesis of protein, and (3) formation of asparagine. These three processes proceed at such relative rates that the nitrogen of the amino acids consumed is almost equally divided between the protein and asparagine formed. These changes are stimulated by indoleacetic acid in a concentration which optimally promotes growth, and are inhibited about 50% by the three inhibitors in concentrations which inhibit growth by 50%. It is concluded that the above process is one of several which are critical for growth. [From authors' summary.]—Harvard Univ.

70. THIMANN, K. V., SLATER, R. R., AND CHRISTIANSEN, G. S.

The metabolism of stem tissue during growth and its inhibition. IV. Growth inhibition without enzyme poisoning.

*Arch. Biochem.*, 1950, 28: 130-7, bibl. 7.

The growth of isolated pea stem sections in auxin solution is strongly inhibited by calcium ions, and somewhat less so by magnesium ions or by mannitol. The inhibition varies almost linearly with the logarithm of the inhibitor concentration. A mixture of  $\text{CaCl}_2$  and KCl gives less powerful inhibition than  $\text{CaCl}_2$  alone, and this varies more nearly linearly with the concentration. [From authors' summary.]—Harvard Univ.

71. WARMKE, H. E., AND WARMKE, G. L.

The role of auxin in the differentiation of root and shoot primordia from root cuttings of *Taraxacum* and *Cichorium*.

*Amer. J. Bot.*, 1950, 37: 272-80, bibl. 37, illus.

From studies of the regeneration of root cuttings of dandelion and chicory, the following observations were made. Changing the position of the cuttings with regard to gravity does not fundamentally affect their tendency to differentiate shoot primordia from the proximal ends and root primordia from the distal ends. The capacity for regeneration is related to volume. The application of indolebutyric acid at 12.5 mg./l. to the distal ends stimulates abundant root formation without interfering with leaf formation at the proximal end. Concentrations of 100, 200 and 400 mg./l. applied distally are injurious to the distal ends and inhibit leaf formation at the proximal ends. Concentrations of 12.5 and 25 mg./l. applied proximally induce root formation. The application of indoleacetic acid or naphthaleneacetic acid produces similar

effects at slightly different concentrations. Applications of auxin in appropriate concentrations to both ends induce root formation at both ends. Treatment of root segments with ethylene chlorohydrin, an auxin inhibitor, results in a few cases in the production of leaves from both ends. "Neutral" and "free" auxin was found to be present in higher concentrations in the distal than in proximal ends of cuttings 96 hours after the start of regeneration. The ability of callus cells to respond to different auxin levels by differentiating either root or shoot primordia is discussed in relation to polarity and to possible mechanisms of root and shoot differentiation.—Fed. Exp. Stat. and Coll. Agric. mech. Arts, Puerto Rico.

72. MIROŠNIČENKO, K. G.

Rooting of cuttings as affected by water extracts of leaves. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1429-32, bibl. 4 [received 1950].

Immersing French bean cuttings [*Phaseolus vulgaris*] in water extracts of beans  $\frac{1}{10}$  (1 g. crude leaf tissue in 50 c.c. water) and geranium (*Pelargonium zonale*)  $\frac{1}{10}$  for 8 days (the extract being changed after 4 days), and then transferring them to tap water, increased the number of roots produced as compared with cuttings in water only. Extracts of nettle leaves caused a slight diminution of rooting.

73. NAYLOR, A. W., AND DAVIS, E. A.

Maleic hydrazide as a plant growth inhibitor.

*Bot. Gaz.*, 1950, 112: 112-26, bibl. 16, illus.

In tests on 11 species, including maize, pea, sunflower, *Xanthium*, tomato and tobacco, the general effects of maleic hydrazide [see H.A., 19: 2680] were found to be very similar on monocotyledons and dicotyledons. Seedlings are the most sensitive to this compound, but it can inhibit growth at any stage up to maturity without killing the plant. The evidence obtained indicates that maleic hydrazide may readily enter the plant through either the leaves or the roots and be rapidly transported to regions of meristematic activity. The usual sequence of symptoms produced in a treated plant is: (a) loss of apical dominance, (b) expansion of leaves already formed, (c) production of a darker green colour, (d) increase in production of anthocyanin pigmentation, and (e) some chlorosis. The inhibiting effect appears to be directly proportional to the concentration used; at low concentrations, generally 0.05%, axillary buds of seedlings begin to grow very soon after treatment, while at a higher concentration, 0.2-0.4%, vegetative bud development is slow and may not take place at all. Root as well as top growth can be affected, and flowering suppressed. At 0.025% maleic hydrazide caused sterilization of the staminate flowers in maize.—Yale University, New Haven, Connecticut, and Carnegie Institution of Washington, Stanford, California.

74. HAMNER, C. L., AND OTHERS.

Selective inhibition of the growth of green plants and fungi by beta methyl umbelliferone.

*Bot. Gaz.*, 1950, 112: 135-7, bibl. 1, illus., being *J. Art. Mich. agric. Exp. Stat.* 1164.

Beta methyl umbelliferone, a substituted coumarin [see H.A., 17: 1364], markedly inhibited the germination and growth of red kidney bean and cucumber seeds

\*For parts I and II see *Ibidem*, 1950, 26: 234-47 and 248-59.



and seedlings, the degree of inhibition being proportional to the concentration used. The inhibition was the result of suppressed root growth and no abnormal growth was observed. Growth of wheat was not affected by any of the concentrations used, while that of peas and maize was only slightly inhibited by the highest concentration used, namely 8,000 p.p.m.—Michigan State College, East Lansing, Mich.

75. DE KOCK, P. C., AND HUNTER, R. F.  
A germination inhibitor from sugar beet.

*Nature*, 1950, 166: 440-1, bibl. 3.

Using peroxide-free "Analar" ether the authors obtained from the water extract of beet seeds an unsaturated yellow oil, which acts as a powerful germination inhibitor of cress and other seeds. The inhibitor was found markedly to affect the rate of oxidation of catechol by the polyphenolase enzyme of sugar beet. As the inhibition of cress seedlings can be reversed by washing, it is thought that the glycolytic reactions continue in the inhibited seed.—Aberdeen University.

76. HOPKINS, H. T., AND TOOLE, E. H.  
Effect of DDT on germination of certain seeds.

*Bot. Gaz.*, 1950, 112: 130-2, bibl. 2, illus.

Pure DDT (p,p'-DDT) was shown to have no effect on the percentage germination of lima-bean, cucumber, rye, or squash seeds planted flat on special crepe paper impregnated with a large amount of this compound. A significant effect of p,p'-DDT on germination of lima-bean seed was noted only when planted with the hilum down; this effect was characterized by a disintegration of the seed before germination could be completed. A depressing effect of Technical DDT is thought to be due to the presence of some component, other than p,p'-DDT, which became inhibitory or toxic at the high level of application used in this work. [Authors' summary.]—Plant Industry Station, Beltsville, Md.

### Colchicine.

(See also 574, 796, 844.)

77. LAZURJEVSKIĬ, G. V., AND MASLENNIKOVA, V. A.

An investigation of colchicine-containing plants of middle Asia. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 63: 449-50, bibl. 2 [received 1950].

In middle Asia there are 3 species of *Colchicum* and 4 of *Merendera*. Of these, only two are widely distributed and may be recommended as sources of colchicine, i.e. *Colchicum kesselringii* Rgl. and *Merendera robusta* Bge. Data are given of the colchicine content of these two plants.

78. HUNTER, A. W. S., AND DANIELSSON, B.  
Induced polyploidy in horticultural crops.  
*Progr. Rep. Div. Hort. centr. exp. Farm, Ottawa*, 1934-1948, 1950, pp. 40-7, bibl. 11, illus.

*Apple*. Data are given on colchicine treatment of seeds, seedlings and young plants. Where seed is plentiful the simple method of germination of after-ripened seeds on filter paper soaked with colchicine

solution is considered to be suitable for apple. Seed dusted prior to the after-ripening process with Ceresan or Semesan for fungal control, however, failed to germinate, and it would appear that a combination of colchicine and the fungicide produces a substance that inhibits germination. From results obtained during the treatment of seedlings and young plants, it appears that if the colchicine application is long and strong enough there is no advantage in multiple over single applications. *Cherry*. The work begun in 1939 has been largely confined to triploid, sterile interspecific hybrids from crosses between the tetraploid sour cherry, *Prunus cerasus*, and the diploid sweet cherry, *P. avium*. *Other plants*. Triploids and tetraploids were obtained in snapdragons, and work with asparagus, radish and tomato is also mentioned. Results of tests with acenaphthene to replace the expensive colchicine as a polyploidizing agent suggest that this substance is probably of very limited value in inducing polyploidy.

79. OLTMANN, W.

Die Herstellung polyploider Pflanzen mit Hilfe von Colchicin-Injektionen. (The production of polyploid plants by means of colchicine injections.)

*Züchter*, 1950, 20: 209-10.

A hypodermic syringe with a fine needle was used successfully for injecting small quantities of colchicine into the stems of dicotyledons at a concentration of 0.50-0.75%. The liquid passes from the cells into the vessels and is carried to the growing point. This method was found much simpler and more economical than any of the standard methods, even that of Schwanitz (see *H.A.*, 20: 35). Its main advantage, however, is that it is applicable to monocotyledons, which may be injected, with great care, directly into the growing point.

80. HAVAS, L. J.

Effect of bee venom on colchicine-induced tumours.

*Nature*, 1950, 166: 567-8, bibl. 5.

Bee venom plus colchicine stimulated shoot and root growth in tomato seedlings more than either of these chemicals administered alone or than water. The incidence of colchicine-induced tumours in tomato and wheat shoots and roots was very considerably reduced as a result of treatment with bee venom. Of the constituents of the venom so far tested, palmitic acid had a marked therapeutic effect, while tryptophane and choline showed practically no activity.—Clinique Solisana, Guebwiller, Haut Rhin, France.

### Radioactive materials.

(See also 281, 665.)

81. PANČENKO, V. G.

Isotopes. [Russian.]

*Priroda* (Nature), 1950, No. 8, pp. 16-26, bibl. 12, illus.

A review of present knowledge of isotopes with particular reference to the radioactive elements. Their application, as indicators, to biological investigations is mentioned and one figure shows a "radio-autograph" of phosphorus, indicating the distribution of radiophosphorus in a tomato leaf.

82. MITCHELL, J. W., AND LINDER, P. J.

**Some methods used in tracing radioactive growth-regulating substances in plants.**

*Bot. Gaz.*, 1950, 112: 126-9, bibl. 1, illus.

1. An inexpensive applicator made to hold radioactive solutions and mixtures in a pipette at a distance from the operator is described. As little as 0.01 ml. of solution can readily be delivered and placed on a plant with this apparatus. 2. A simple method of plating samples of ground radioactive plant tissues on the tacky surface of cellophane is described. The method makes possible the measurement of radioactivity in a weighed sample of ground tissue spread in an even layer essentially one particle in thickness. 3. Evaluation of counts in terms of weight of the tagged compounds was accomplished by impregnating a plated sample of tissue with a known amount of the tagged compound. [Authors' summary.]—Bureau of Plant Industry, Beltsville, Md.

83. DROBKOV, A. A.

**Radiophotographic method of quantitative determination of natural and artificial radioactive elements in plants.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, 68: 177-80, illus.

A discussion on the role of radioactive substances in plants, particularly with reference to the elements radium, uranium, and thorium, and on their distribution and intensity in the plant organs. Radiophotographs are shown of leaves of tomato, clover and pea from plants grown in water cultures with complete nutrients plus  $1.45 \times 10^{-11}$  % radium.

84. CUMINGS, G. A., HULBURT, W. C., AND ELDREDGE, D. B.

**Development of a dispenser for applying radioactive phosphatic fertilizer.**

*Agric. Engng.*, 1950, 31: 275-7, from abstr. in *Soils and Ferts.*, 1950, 13: 1936.

The dispenser consists essentially of a stationary enclosed hopper box with an endless-belt bottom. Longitudinal floating panels serve as the side of the box and as partitions for dividing the hopper into two or more compartments. Spouts with dividers directly under the partition panels collect and channel the fertilizer into the delivery tubes.

85. STEWARD, F. C., AND THOMPSON, J. F.

**Photosynthesis and respiration: a reinterpretation of recent work with radioactive carbon.**

*Nature*, 1950, 166: 593-6, bibl. 14.

This analysis is a reinterpretation of the experimental results obtained by the California and Chicago schools; it constitutes an attempt at resolving the discrepancy between the two views.

86. SISAKJAN, N. M., AND VORONKOVA, V. JA.

**The exchange of radioactive phosphorus between the scion and the rootstock in hybrid plants.**

*Doklady Akad. Nauk S.S.S.R.*, 1950, 70: 275-7, bibl. 6, illus.

That there is exchange of nutritive substances between scion and rootstock in grafted plants was shown in

grafted tomato plants, of different varieties, by introducing (by vacuum infiltration) radioactive phosphorus, in water solution of sodium phosphate, into leaves of the scion, and later testing organs of scion and rootstock for the presence of the radioactive substance.

### Mineral nutrition.

87. WALLACE, T.

**The mineral nutrition of crops, with special reference to fruit crops.**

[*Publ.*] *Cawthron Inst.*, 1950, pp. 22, illus.

In the Cawthron Lecture, 1949, the author discusses (1) essential and beneficial elements for plant growth, (2) the effects of essential elements on plants (N, P, Ca, Mg, K, S, Fe, Mn, Cu, Zn, B, Mo), (3) effects of excesses of plant nutrients (Mg, Al, Cl, B and heavy metals), (4) problems concerning the supply of mineral nutrients to plants, (5) the mineral status of crops, (6) soil conditions in relation to nutrient supplies to crops, (7) particular requirements of different crops for mineral nutrients, (8) special problems of the mineral nutrition of fruit crops.

88. HOBBS, J. A., AND BERTRAMSON, B. R.

**Boron uptake by plants as influenced by soil moisture.**

*Proc. Soil Sci. Soc. Amer.* 1949, 1950, 14: 257-61, bibl. 7, illus., being *J. Pap. Purdue Univ. agric. Exp. Stat.* 428.

Boron deficiency observed on some Indiana soils in dry summers seemed to be associated with the moisture condition of the soil. Results of greenhouse experiments with tomatoes showed that the fast-growing plants were not able to obtain enough boron from the dry surface soil to maintain normal development, even though adequate moisture was available in the sub-soil. This suggested that plants growing on soils with dry surface layers might become deficient in boron, if the moisture levels did not contain enough of the nutrient for normal growth. Hence boron fertilizers may increase the supply of this nutrient to plants only when applied at seasons when rains may be expected to move it into the zones where it will be available throughout the dry periods.

89. ASKEW, H. O.

**Some aspects of boron deficiency in plants.**

*Pap. Brit. Commonw. sci. off. Conf.*, being *Publ. Cawthron Inst.* 96, pp. 6.

A short survey of some of the problems still requiring investigation on the function of boron in plants and of the conditions governing the availability of boron to plants.

90. HASLER, A., AND MAURIZIO, A.

**Die Wirkung von Bor auf Samenansatz und Nektar-sekretion bei Raps (*Brassica napus* L.). (The action of boron on the setting of seed and nectar secretion in rape.)**

[English summary  $\frac{1}{2}$  p.] *Phytopath. Z.*, 1949, 15: 193-207, bibl. 31, illus.

In rape, boron is necessary for fruiting. Flowers can be fertilized by artificial pollination only when the plants are supplied with sufficient boric acid, but the



boron status of the pollen-producing plant is immaterial. Boron manuring does not affect the quantity and sugar concentration of the nectar.

91. SCHMALFUSS, K.  
Zur Bedeutung des Chlors als Pflanzen-  
nährstoff. (The significance of chlorine as  
a plant nutrient.)  
*Z. PflErnähr. Düng.*, 1950, 49: 218-23,  
bibl. 4.

Following earlier experiments with beetroot it was shown that chlorine in the form of chloride acts as a nutrient to other halophilous or nitrophilous plants, such as spinach.—University Halle.

92. HINKLE, D. A., AND EISENMENGER, W. S.  
Chloroplast pigments in relation to mag-  
nesium deficiency.  
*Soil Sci.*, 1950, 70: 213-20, bibl. 6.

The data obtained from analyses of leaves of a number of plants, including apple, raspberry, carrot, tobacco and tomato, indicate that magnesium deficiency causes not only a loss of chlorophyll in the lower leaves but also a loss of xanthophyll and carotene. The loss of each 20 parts of chlorophyll was accompanied by a loss of two parts of xanthophyll and one part of carotene.—Mass. agric. Exp. Stat.

93. SMITH, A. M., AND SIMPSON, K.  
Factors affecting the uptake of phosphorus  
by plants.  
*J. Sci. Food Agric.*, 1950, 1: 208-12, bibl. 3.

A study has been made in a series of 16 field experiments of the recovery by turnips of the phosphorus applied in various phosphatic fertilizers, superphosphate at two rates (0.33 and 0.66 cwt.  $P_2O_5$  per acre) being used as a standard. The recovery of phosphorus varied from less than 5 to almost 40%; it was nearly always greater from superphosphate than from other fertilizers, and it was nearly always greater from the low than from the high rate of phosphate application. The soil properties which were most closely related to the percentage recovery were exchangeable calcium and citric-soluble phosphate. Summer rainfall was also found to exert a considerable influence on the recovery of the phosphorus added. [From authors' abstract.]-Edinburgh and East of Scotland College of Agriculture.

94. TUEVA, O. F., AND SAMOÏLOVA, S. A.  
The effect of phosphate nutrition on the  
assimilation and distribution of nitrogen in  
plants. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 62:  
717-20, bibl. 7 [received 1950].

In experiments carried out with pumpkins, the nitrogen gradient in leaves at different distances along the stem differed in relation to phosphate nutrition. In plants starved of phosphates the N content of basal leaves differed little from that of those at the apex but was higher than that of leaves towards the middle of the stem. Plants cannot make full use of nitrogen when growing in a solution without phosphorus, and the accumulation of the non-protein N content leads to reduced ability of the protoplasm to assimilate nitrogen compounds from the surrounding media.

## Water cultures.

95. FRANCO, C. M., AND LOOMIS, W. E.  
Absorção de fósforo e ferro, de soluções  
nutritivas. (The absorption of phosphorus  
and iron from nutrient solutions.) [English  
summary  $\frac{1}{2}$  p.]  
*Bragantia*, 1948, 8: 81-9, bibl. 6, illus.  
[received 1950].

Maize, broccoli, soyabean, tomato, sunflower, cotton and rice plants were used in a study of the absorption of phosphorus and plant development in 4 types of nutrient solutions. The results are discussed. It is considered that iron chlorosis has more effect on solution culture results than any other single factor. Iron absorption from cultures is reduced by phosphorus at pH 6.0 or higher. The use of  $Ca_3(PO_4)_2$  reduces the trouble, as does the use of enough  $KH_2PO_4$  to maintain a pH below 5.5. In tank culture  $H_2SO_4$  may be used to achieve the same result more cheaply. With the Knop type of solution chlorosis can be reduced or prevented by omitting phosphorus from the solution at first, and adding it separately 2-4 days later after iron has been absorbed.

96. RÖSZLER, P.  
Die Methodik der erdelosen Pflanzenzucht.  
(A soilless culture method.)  
[Mimeo. Publ.] Daisendorf b. Meersburg/  
Bodensee, 1950, pp. 11, illus.

A description is given of the method used by the Experimental and Research Establishment for Soilless Culture, Daisendorf nr. Meersburg/Lake Constance. A mixture of pumice sand and slack is used as a growth medium and other suitable materials are also being tried. Watering is done using a solution which is changed periodically, its level being adjusted according to the root development. The adaptation of an ordinary glasshouse to this method of cultivation is described, and details are given of the composition of the nutrient solution.

97. (TICQUET, C. E.)  
Nutriculture.  
*J. soilless Cult. Soc.*, 1950, 1: 5: 4-5.

A summary of the latest information available on the extensive soilless culture undertakings of the American Army Air Force in Japan, which include an 80-acre installation.

98. STUART, N. W.  
Growing plants without soil.  
*Scientific Monthly*, reprinted in *J. soilless  
Cult. Soc.*, 1949, 1: 4: 2-13, bibl. 22.

The history and the different types of soilless cultivation are outlined, and soilless culture installations, mainly American, are described.

99. WYND, F. L.  
The use of iron-containing frit as a new  
medium for hydroponic culture.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1950,  
33: 52-3.

A note on a new growth medium containing 5.0-5.2% iron, calculated as  $Fe_2O_3$ , on which wheat, roses, gardenias, chrysanthemums, snapdragons, beans and blueberries have been grown successfully without addition of Fe to the nutrient solution. A detailed report is to be published shortly.

**Practical devices.**

(See also 1052, 1226.)

## 100. PLANT, A.

**The horticultural tractor.***Gr. Digest*, 1949, 1: 3: 24-7.

While many different more or less suitable designs are produced, they are all considered to have some shortcomings. The author sets out his own ideas on what a horticultural tractor should consist of and stipulates that such a machine of standard design should be produced and marketed for less than £250.

## 101. REA, H. E., HULBURT, W. C., AND ADAMS, J. E.

**A multiple-cell, belt-type distributor for use with tractor implements in fertilizer tests with field crops.***Proc. Soil Sci. Soc. Amer.* 1949, 1950, 14: 391-5, bibl. 3, illus.

A further refinement is described for the multiple-cell hopper [see *H.A.*, 20: 531] designed to apply N, P, and K simultaneously but independently.

## 102. DURY, R.

**Rapport sur le "Pulvopal". (A report on the Pulvopal soil injector.)***Jardins Fr.*, 1950, 4: 134-5, illus.

An illustrated description is given of the Pulvopal, designed for the injection of synthetic insecticides into the soil, and tested at the Luxembourg Garden, Paris, by the Comité des Industries. It injects 60 c.c. per second and performs 8 injections of 300 c.c. in 1½ minutes. In the case of a 300 c.c. application the insecticide spreads in the soil within a circle of 20 cm. radius around the point of injection. The Pulvopal is designed for use in nurseries, in market gardens, and in floriculture.

## 103. DELBARD, G.

**Rapport sur "le Crabe" appareil pour l'arrachage des arbres en pépinière. (The mechanical lifting of nursery trees.)***Jardins Fr.*, 1950, 4: 133-4, illus.

The "Crabe", a little machine for the mechanical uprooting of young trees, was tested by the Comité des Industries at the Luxembourg Garden, Paris. Apart from making the work lighter—it is operated by a winch—the machine has the advantage of avoiding any injury to either stem or roots in the process of lifting.

## 104. ANON.

**Umgraben künftig ohne Bücken, Anheben und Umkippen. (Digging without bending, lifting and turning.)***Gärtnermeister*, 1950, 53: 303, illus.

A sprung spade is briefly described and illustrated which does the work of digging automatically once it is pushed down into the soil. Pulling up the "handle-bar" at the top—which involves no effort—causes the soil to be lifted, turned and thrown into the trench at the required distance. At the horticultural show in Stuttgart, where this new tool (Terrex) was exhibited by the Wolf G.m.b.H., sceptics are said to have been converted.

## 105. ANON.

**Eine neue Etikette. (A new label.)***Gärtnermeister*, 1950, 53: 327, illus.

A Swiss firm has produced an aluminium label on which writing with an ordinary pencil is resistant to rain and oxidation. The writing can be removed if desired.

## 106. ROSTON, P. J.

**As ferramentas e máquinas agrícolas nacionais. Parte I: As enxadas calçadas. (The agricultural implements and machinery of Brazil. I. Faced hoes.)** [English summary ½ p.]*Bragantia*, 1948, 8: 1-17, bibl. 6, illus. [received 1950].

This is the first report on an investigation, carried out at the Instituto Agrônômico, Campinas, on the quality of Brazilian agricultural implements. Brazilian hoes were judged to be of poorer quality than British ones, owing to lack of uniformity in the raw materials used, the heat treatment and the method of facing. Suggestions are made for their improvement.

## 107. CUNNINGHAM, R. H.

**A mechanical shaking device.***Sci. Agric.*, 1950, 30: 396-7, illus.

A machine designed and built at the Dominion Laboratory of Cereal Breeding, Winnipeg, for the purpose of mixing seed and fungicide is described and illustrated. The device is for laboratory use and, besides seed treatments, it can be utilized for preparing emulsions, mixing paints, etc.

## 108. HAGLER, T. B.

**The close-up framer for horticultural photography.***Proc. Amer. Soc. hort. Sci.*, 1950, 55: 265-7, bibl. 3, illus.

A short account is given of the construction of a close-up framer and supplementary lens and its use in photographing such objects as leaves, fruits, flowers and roots either indoors or in the field.

**Noted.**

## 109.

## a ALLEN, N. S., WILSON, G. B., AND POWELL, S.

**Comparative effects of colchicine and sodium nucleate on somatic chromosomes of *Allium* and *Tradescantia*.***J. Hered.*, 1950, 41: 159-63, bibl. 13, illus.

## b ASAI, T.

**Über die Mykorrhizenbildung der Leguminosen-Pflanzen. (Mycorrhiza formation in leguminous plants.)***Jap. J. Bot.*, 1944, 13: 463-85 [received 1950].

## c BASSHAM, J. A., BENSON, A. A., AND CALVIN, M.

**The path of carbon in photosynthesis. VIII. The rôle of malic acid.***J. biol. Chem.*, 1950, 185: 781-7, bibl. 12.

## d BUREAU TECHNIQUE ALWA.

**La pluie artificielle. (Artificial rain.)***Courr. hort.*, 1950, 12: 448-50.

Notes on various aspects of applying overhead irrigation.



- e BURSTRÖM, H.  
Studies on growth and metabolism of roots.  
IV. Positive and negative auxin effects on cell elongation.  
*Physiol. Plant.*, 1950, 3: 277-92, bibl. 9.  
Carried out on wheat seedlings at the Botanical Laboratory, Lund.
- f ČAĽAHJAN, M. H., AND RUPČEVA, I. A.  
The effect of interrupting the light period with darkness in the photoperiodic reaction of plants. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1441-4, bibl. 10, illus. [received 1950].
- g CANNON, H. G.  
The technique of biological staining.  
*Endeavour*, 1950, 9: 188-95, illus.  
With 16 beautifully reproduced coloured figures.
- h HÅKANSSON, R.  
Swedish agricultural administration, education and research: a manual for visitors. [Publ.] *Swedish agric. Inf. Off. Stockholm*, 1950, pp. 35, illus.
- i KORIBA, K.  
Über die Konvektion und Verdunstung als physikalische Grundlage der Transpiration. (Convection and evaporation as the physical basis of transpiration.)  
*Jap. J. Bot.*, 1943, 13: 1-242, bibl. 92 [received 1950].
- j LOUPO, M. W.  
Power and water requirements, equipment, and cost factors for sprinkler irrigation.  
*Proc. Vt. St. hort. Soc.*, 1950, 54: 37-40.
- k MANIG, M.  
Monatsmittel der Lufttemperatur in Deutschland für die Periode 1881-1940. Teil I: Süddeutschland, Hessen. (Monthly mean air temperatures in Germany for the period 1881-1940. Part I: Southern Germany, Hessen.)  
*Mitt. dtsch. Wetterdienst. U.S. Zone 4*, 1950, pp. 31+12 maps.
- l MONSI, M.  
Untersuchungen über die pflanzliche Transpiration, mit besonderer Berücksichtigung der stomatären und inneren Regulation. (A study of plant transpiration, with special reference to stomatal and internal control.)  
*Jap. J. Bot.*, 1944, 13: 367-433, bibl. 90 [received 1950].
- m MONTFORT, C., AND HAHN, H.  
Atmung und Assimilation als dynamische Kennzeichen abgestufter Trockenresistenz bei Farnen und höheren Pflanzen. (Respiration and photosynthesis as dynamic indicators of graded drought resistance in ferns and higher plants.)  
*Planta*, 1950, 38: 503-15, bibl. 20.
- n MONTFORT, C., AND KRESS-RICHTER, I.  
Reversible photochemische Chlorophyllzerstörungen in besonnten Laubblättern von Aureaformen und ihre Beziehungen zu Strahlungsklima und Erbgut. (The reversible photochemical chlorophyll destruction in foliage leaves of aurea forms exposed to the sun and its relation to radiation and genetical constitution.)  
*Planta*, 1950, 38: 516-20, bibl. 9.  
The plants investigated include *Humulus lupulus* var. aurea.—University Frankfurt/Main.
- o NEWCOMB, E. H.  
Tobacco callus respiration and its response to 2,4-dinitrophenol.  
*Amer. J. Bot.*, 1950, 37: 264-71, bibl. 21.
- p ROHWER, C.  
Friction losses in selected valves and fittings for irrigation pumping plants.  
*Tech. Bull. Colo. agric. Exp. Stat.* 41, 1950, pp. 36, bibl. 6, illus.
- q DE ROPP, R. S.  
The comparative growth promoting action of indole-3-acetic acid and *Agrobacterium tumefaciens* [on carrot and artichoke].  
*Amer. J. Bot.*, 1950, 37: 352-63, bibl. 29, illus.
- r SAMYGIN, G. A.  
The effect of strong and of weak light, given before and after a dark period, on the development of perilla and rudbeckia. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1265-8, bibl. 7, illus. [received 1950].
- s SANDERSON, M.  
Three years of evapotranspiration at Toronto.  
*Canad. J. Res., Sect. C*, 1950, 28: 482-92, bibl. 7, illus.
- t SCHNELLE, F.  
Studien zur Phänologie Mitteleuropas. (A study of the phenology of Central Europe.)  
*Ber. dtsch. Wetterdienst. U.S. Zone*, 1948, No. 2, pp. 1-28, bibl. 20 [received 1950].
- u SHERMAN, R. W.  
Policing international plant traffic.  
*Flor. Exch.*, 1950, 115: 13: 17, 19, illus.  
A popular review of the plant import regulations of various countries.
- v U.S. DEPARTMENT OF AGRICULTURE.  
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*Agric. Handbook Agric. Res. Admin. U.S. Dep. Agric.* 3, 1950, pp. 209.
- w WRIGHT, J. E., AND SRB, A. M.  
Inhibition of growth in maize embryos by canavanine and its reversal.  
*Bot. Gaz.*, 1950, 112: 52-7, bibl. 12, being *Pap. Dep. Plant Breed. Cornell Univ.* 253.
- x ŽDANOVA, L. P.  
On the rate of flow of the flowering hormones during photoperiodic induction. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 553-6, bibl. 4 [received 1950].  
Observations on *Perilla ocymoides* and *Rudbeckia bicolor*.

## TREE FRUITS, DECIDUOUS.

*General.*

## 110. ROESSL D., H.

Über den Obstbau in Peru. (Fruit growing in Peru.)

*Dtsch. Baumsch.*, 1950, 2: 260-4, illus.

The cultivation of deciduous fruits in Peru is restricted owing to the absence of complete dormancy. Cherries, apricots, almonds and soft fruit will not grow at all. A serious limiting factor appears to be rootstocks. Pears and apparently sometimes apples are grown on quince stocks, *Cydonia vulgaris*, while the majority of peaches are seedlings. Varieties are limited and the quality of fruit is mostly poor. Plant protection, with some exceptions, does not appear to be a very important feature of Peruvian fruit growing; pests such as aphids, while widespread, do not affect the yield. Walnuts, hazel nuts, chestnuts and pistachio are grown, though only in small quantities, but olives are of considerable importance.

## 111. JOHANSSON, E.

Fruit growing in Sweden.

*Fruit Year Book*, 1950, pp. 45-53, bibl. 3, illus.

A brief survey is given of the history of fruitgrowing in Sweden, the extent and localization of the industry, general methods of culture and the main varieties of top and soft fruits grown. Scania, in southernmost Sweden, possesses the greatest number of fruit trees per unit area, even peaches and apricots being grown there. Apples and berried fruits are grown more or less successfully up to the northernmost part of the country. The apple is by far the most important fruit crop, Gravenstein, Cox's Orange, Belle de Boskoop, Laxton's Superb and Ontario being the chief commercial varieties. Seedling rootstocks are still used to a great extent, as Malling clonal stocks are in short supply. The clonal stock A2, selected at Alnarp, is arousing interest, as it is hardy and vigorous yet induces early bearing.

## 112. MONTANARI, V.

La produzione frutticola nelle Venezie.

(Fruit growing in Venetia.)

*Agric. Venezia*, 1950, 4: 149-57.

An account of the fruit yields of Venetia in comparison with those of the whole of Italy, with a discussion on the possibility of increasing them.

## 113. TURNER, A.

Fruit growing in southern Ireland.

*Fruit Year Book*, 1950, pp. 28-36, illus.

The climate of southern Ireland, although not a serious limiting factor in fruitgrowing, does present certain problems. The 68° F. August isotherm, which encloses all the principal dessert apple-growing areas in England, is in Ireland confined to a small district in south Kilkenny. The southern counties, where the greatest area of good apple-growing soils is situated, have an average rainfall of 40-50 inches, which makes the trees extremely liable to scab and canker and the fruit difficult to "finish". Scab is the major problem with apple growers all over the country, and it has been found that under Irish conditions infected bud scales are a much more serious source of infection than are

the perithecia on fallen leaves. In spite of these difficulties, official records show that about 10,000 acres of apples and 3,000 acres of other kinds of fruit are grown in the republic. Pears are not grown commercially in the open, plums only to a very limited extent, although damsons are plentiful, and there are only 2 cherry orchards in the country. The climate and soils, however, are particularly suitable for the production of small fruit, and there are extensive plantings of black currants, raspberries, gooseberries and strawberries in the area around Dublin.

## 114. JOHNSTON, A. E.

Fruit growing in northern Ireland.

*Fruit Year Book*, 1950, pp. 37-44, illus.

In spite of the high rainfall and lack of sunshine, fruit growing has been for many years a special feature of certain parts of northern Ireland, apples being by far the most important crop grown. More than 80% of the apples, currants, gooseberries and raspberries are produced in the districts bordering the south of Lough Neagh, while strawberry production is concentrated mainly in the area south of the Mourne Mountains in County Down. The main problems of production and the development of the apple and soft fruit industries are dealt with.

## 115. JOHNSTON, R. E.

Apple growing in Northern Ireland.

*Gr. Digest*, 1949, 1: 3: 20-4.

A brief account is given of apple growing in Northern Ireland which is concentrated mainly in County Armagh, East Tyrone and South Antrim. The total acreage is more than 7,000, mostly found in small units on mixed farms. Bramley's Seedling is the principal variety and Grenadier the main pollinator, while there are small plantings of the newer dessert varieties such as Laxton's Superb and Ellison's Orange. Grading, packing and marketing, organized on the British lines, are dealt with; pest and disease control and fertilizer practices are mentioned.

## 116. McGRATH, J. V.

Apple growing on coasts near Sydney.

*Agric. Gaz. N.S.W.*, 1950, 61: 239-41, illus.

A general account giving the range of apple varieties grown and recommendations of varieties suitable for growing in three districts.

## 117. NOTTAGE, I. L.

An Auckland gumland orchard.

*N.Z. J. Agric.*, 1950, 80: 535-9, illus.

This article deals with the successful development of an orchard on gumland (land, generally with a heavy clay subsoil, on which kauri trees grew many years ago) near Auckland. The plan shows *Pinus radiata* shelter belts around each block. A graph indicates the relative importance of apples in the orchard.

## 118. O'LEARY, E. H.

El cultivo de la morera. (Mulberry growing.)

*Suelo Tico*, 1949, 3: 250-5, illus.

The cultivation of mulberry trees for supplying the silkworm industry in Costa Rica is described. The trees do well in all districts up to 1,200 m. They



prefer a deep, medium soil which should be well manured with compost or green manure; applications of 200-300 kg. bone meal every second year are recommended. Propagation by seed, layering, grafting and cuttings is described, the last method being the most usual. Planting is best done at the beginning of winter or during the rainy season. Trees may be grown to any height, but for the silkworm industry intensive plantations of dwarf trees, with stems 40 cm. high, are most satisfactory.

119. MARINUCCI, M.  
L'impianto dell' oliveto. (Olive growing.)  
*Manuale prat. Agric.\** 141, 1946, pp. 73,  
illus. [received 1950].

A short practical manual on olive growing with special emphasis on methods of propagation, the chief of which will, in the author's opinion, for economic reasons, continue to be budding on seedlings. Other methods, e.g. by ovuli or cuttings, are also described.

120. DE WET, A. F.  
The laying-out of orchards. II. Orchard systems.  
*Fmg S. Afr.*, 1950, 25: 193-5.

Part I is mentioned in *H.A.*, 20: 2312. This article describes different forms of orchard lay-out, namely, square, quincunx for interplanting, hexagonal, and planting along the contour. The description of the procedure is in each case accompanied by diagrams.

121. GNEDČIK, P. V.  
The spacing of fruit trees. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950,  
No. 9, pp. 12-16.

A review is given of spacing practices in Russia with recommendations by the author that are not wholly accepted by his editor. Apple and pear, and plum and morello cherry plantation spacings in White Russia are discussed in some detail with regard to rootstock and system of planting, i.e. square, rectangular and staggered patterns. Climatic and soil conditions and the role of protective hedges are important factors to be considered when laying out new orchards.

122. CUNY, L.  
Le capital fruitier. Son estimation. (The assessment of the capital value of fruit trees.)  
*Jardins Fr.*, 1949, 3: 206-17.

Formulae are presented for assessing the capital value of fruit trees, taking into account such factors as age, longevity, yield per cubic area of the top, climate, soil, general state of health and management of the orchard, etc. Tables, graphs and diagrams help to demonstrate how the calculations should be made and the results adjusted.

- [123. SMITH, M. G.  
Deciduous fruit bibliography.  
[Mimeo. Publ.] Univ. Cape Town, Library  
School, 1947, pp. 25 [received 1950].

The bibliography which contains 168 references to literature on the deciduous fruit industry in South Africa is divided in the following sections: *General*: The fruit industry in South Africa, the cultivation of

fruit, diseases and pests and their control, sprays and spraying, picking, packing and storage. *Individual fruits*: Apples, grapes, peaches, pears and plums. Author and subject indexes are provided.

### Breeding and varieties.

(See also 78, 234r, s, 301, 1212, 1216, 1227, 1233, 1235.)

124. DAVIS, M. B., BLAIR, D. S., AND HUNTER, A. W. S.  
Fruit breeding.  
*Progr. Rep. Div. Hort. centr. exp. Farm, Ottawa, 1934-1948, 1950*, pp. 15-31, bibl. 12, illus.

The progress of fruit breeding work at the Central Experimental Farm, Ottawa, is reported for a 14-year period. *Apples*. The chief aim is to produce hardy varieties, later than McIntosh. Several new varieties have been introduced for trial, but none can yet be recommended for commercial planting. New early varieties, while a lesser problem, are also under test. *Pears*. Improvement work is going on with the object of producing high quality pears that are fully hardy, suitable for both canning and dessert purposes, good keepers, and resistant to fire blight. *Cherries*. Considerable difficulties have been experienced in breeding sweet cherries hardy enough for Canadian conditions. Work with sour cherries seems more promising. *Plums*. Crosses between Japanese varieties and varieties derived from *Prunus americana* and *P. nigra* provide good material for the selection of hardy, large-fruited, high-quality plums. *Filberts*. Successful crosses have been made with some of the larger-fruited, better-quality European-type varieties using *Corylus americana* selections as the female parent. *Strawberries*. Between 1933 and 1948, 92 new selections were distributed for trial. Three of these, Tupper, Louise and Elgin, have assumed some importance because of their late maturity. King and Mackenzie, two early midseason varieties, are being grown to a limited extent. Resistance to disease is stressed and an evaluation of varietal susceptibility to leaf hopper injury is given. *Raspberries*. The aim has been to develop varieties that are winter hardy, disease free, productive and bear reasonably large, firm fruits with good flavour. Seedlings of Lloyd George  $\times$  Newman 23 are the most promising. *Black currants*. Two selections, O-381 and O-393, both from the cross *Ribes ussuriense*  $\times$  *R. nigrum* var. Kerry, showed immunity from white pine blister rust, *Cronartium ribicola*. Vitamin C content of the rustless varieties seems lower than that of the standard varieties, but it should not be difficult to increase it. *Red currants*. Resistance to aphids is the main breeding objective, and crosses between the variety Viking and the wild asiatic species *Ribes diacantha* are being tested. *Gooseberries*. An attempt to breed thornless varieties began in 1918 with the crossing of the English variety Victoria with a thornless plant of *Ribes oxycanthoides*. Almost complete thornlessness has been achieved.

125. ČERNENKO, S. F.  
Ontogenetic changes of young hybrid seedlings. [Russian.]  
*Agrobiologija* (Agrobiology), 1949, No. 6, pp. 73-80.

\* Publishers, Ramo Editoriale degli Agricoltori, Via Quattro Fontane, Rome.

A review of observations and conclusions of Mičurin and Lysenko with a discussion on the effect of heredity and environment on seedling plants with special reference to apple.

126. QUEIROZ, J. DE B. R.

Estudos sobre adaptação de diferentes fruteiras. (A study of the adaptation of various fruit species and varieties [to conditions in Angola].) [English and French summaries  $\frac{1}{2}$  p. each.]

*Agron. angol.*, 1949, 2: 157-72.

Although many kinds of fruit are grown on the plateau of Huila, Angola, the quality and quantity produced are generally low. In order to improve the standard of production, observations were made on the performance of numerous species and varieties of fruit, either of local origin or imported from Portugal or South Africa, grown at the Humpata Agricultural Station. Apple and citrus seemed to be particularly well adapted to conditions on the plateau. Other fruits studied include the pear, quince, medlar, peach, apricot, plum, cherry, almond, fig, guava, pomegranate and walnut.

127. ROBY, F.

La colección de frutales de la Estación Experimental de Mendoza. (The fruit tree collection of the Mendoza Experimental Station.)

Reprinted from *Idia*, 1950, 2, No. 30, pp. 8, bibl. 7, illus.

An account is given of the establishment of a collection of 559 varieties of fruit trees at the Mendoza Experimental Station in Argentina. The collection was started in 1945, and consists of almost all the varieties of almonds, cherries, plum, damsons, peaches, apples, pears, olives and nuts now grown in the country as well as a considerable number of foreign varieties. The trees will be used for breeding purposes, and their performance will be studied with a view to determining the most suitable varieties for growing commercially in Argentina. A complete list is given of the varieties contained in the collection.

128. ROBY, F.

La colección pomológica de la Estación Experimental de Mendoza. (The pomological collection of the Mendoza Experimental Station.)

[Mimeo. Publ.] *Estac. exp. Mendoza, Argentina*, 1949, pp. 38.

A catalogue of the fruit tree collection referred to in abstract 127 above, containing information on the stocks used, mainly seedling, and on the origins of the scion material.

129. LESJUK, E. A.

Mičurin's apple varieties. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 6, pp. 10-15, bibl. 3, illus.

Several apple varieties raised by Mičurin are described. Observations made in the nursery and in the field, yields and degree of frost resistance are given.

130. KORDON, R. JA.

Apple varieties for the north-western zone of the U.S.S.R. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 22-4, illus.

Old varieties suitable for cultivation in the Leningrad and other north-western areas are enumerated and brief notes are given on the characteristics of a number of newer varieties.

131. KEDRIN, S. P.

New apple varieties for the middle Volga region. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 19-23.

Notes on the origin and characteristics of 9 mid-season and late frost-resistant apple varieties.

132. CARLONE, R.

Sulla presumibile origine della varietà di melo Piemontese "Morella". (On the probable origin of the Piedmont apple variety Morella.)

Reprinted from *Att. III Congr. naz. Fruttic., Ferrara*, 1949, 1950, pp. 8, bibl. 15.

The author discusses the evidence in favour of Morella being the same as, or a bud sport of, Rome Beauty, or of American origin, or, alternatively, of unknown seedling origin. He is working on the problem and proposes in a further publication to offer a definite decision.

133. ČERNENKO, S. F.

The new apple variety Suvorovec. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 6, pp. 20-3, bibl. 1, illus.

Suvorovec, a hybrid of Antonovka  $\times$  Simirenko reinette, grafted with Antonovka as mentor is a very valuable late apple. It was raised in 1928 at the Central Genetical Laboratory of the U.S.S.R. It makes vigorous growth and possesses a high degree of frost resistance and considerable resistance to fungal diseases. The fruit is fairly large, green with white flesh and a small core, and keeps very well.

134. EINSET, J.

The Wrixparent, a "tetraploid" apple.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 262, bibl. 1.

A brief note on this variety, which is a diploid-tetraploid periclinal chimaera of the simplest type. It is a "giant" sport probably of the Yellow Transparent apple.

135. ILJUŠČENKO, K. L., AND MORDKOVIČ, M. S.

Greater consideration for small-fruited crab apples. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 23-7, illus.

To utilize the small-fruited crab apples grown in protective belts, an evaluation of their preserving properties was made. Eight out of 20 varieties were selected and studied at the All Union Scientific Experimental Institute for the Preserving Industry, and 6 were found to be suitable for either cooking, preserving in syrup, pickling or freezing.

136. BALAŠOV, P. K.

Kamyšin apricots.

*Agrobiologija* (Agrobiology), 1950, No. 1, pp. 155-8, illus.

At the Kamyšin (Kamyshin) Forest Improvement Centre observations have been made on certain wild



forms of fruit trees grown there, including apricot. A table shows the chief characters of four of these forms.

137. VOLKOV, S. A.

**Apricots in the coastal region.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950,  
No. 7, pp. 24-6.

Considerable difficulties were experienced in establishing the apricot in the far eastern coastal regions of the U.S.S.R. The European varieties were not hardy enough, and seedlings of the Manchurian varieties bore fruits of inferior quality. Some of the cultivated European varieties, however, survived, and seeds of the third generation produced hardy seedlings, which in turn were selected and further propagated. Crossings between cultivated European varieties and cultivated and wild local Manchurian varieties were even more promising. Brief notes are given on the origin and characteristics of varieties recommended for the Soviet Far East.

138. PUHTINSKIĬ, JU. E.

**The problem of moving the apricot northward.** [Russian.]  
*Agrobiologija* (Agrobiology), 1949, No. 3,  
pp. 182-3.

This is a brief account of breeding work with apricots at the Voronezh regional fruit research station carried out with the object of raising frost resistant apricots bearing fruit of good quality, suitable for northern regions. A short description is given of one of the hybrids with these characters.

139. KAZJMIN, G. T.

**The apricot variety Mičurin's Best in Chabarovsk.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950,  
No. 7, pp. 26-8, illus.

This variety was introduced to the Soviet Far East from the Central Genetical Laboratory in 1938. During the first 2 years the plants were grown as very low, spreading bushes which were completely earthed up during the winter. The following 2 years only partial protection was given, and later, when they grew into a natural bush shape, no protection was possible. In 1950 they were 3·2 m. high with a spread of 4·5 m. and the diameter of the stem at the base was 25 cm. Observations made during the 12 years are given. Mičurin's Best is now recommended as a valuable variety for the southern areas of the Far East.

140. BOLONJAEV, A. V.

**A new valuable apricot variety for the north.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950,  
No. 8, pp. 52-3.

Notes on the origin and characteristics of a hardy apricot variety, called Most Northerly, suitable for the northern parts of the Soviet Far East.

141. ILJINSKIĬ, A. A.

**The Moldavian cherry.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950,  
No. 9, pp. 27-9, illus.

In the Crimea the Moldavian cherry is widely grown and is used mainly for preserving. The plantations

suffered heavily during the last war and their replanting and extension is urged. Varieties belonging to this group are described.

142. CAPUCCI, C.

**La ciliegia Moretta di Vignola. (The cherry Moretta di Vignola.)**  
*Ital. agric.*, 1950, 87: 495-502, bibl. 7, illus.

The distribution of this variety in Italy is mentioned, and it is stated to merit more extended cultivation. It is described in detail with a table showing the dimensions of the various organs, and there are illustrations showing the habit of the tree, flowers, fruit and stones.

143. CONDIT, I. J.

**An interspecific hybrid in *Ficus*.**  
*J. Hered.*, 1950, 41: 165-8, bibl. 6, illus.,  
being *Pap. Calif. citrus Exp. Stat.* 634.

An interspecific hybrid between the evergreen-vine fig *Ficus pumila* and the common deciduous-tree fig *F. carica* has been produced. This appears to be the first record of an artificially-produced hybrid between two species of the genus. Leaves are intermediate in characters between those of the two parents. Syconia are nonparthenocarpic and resemble those of the female parent, *F. pumila*, except for their smaller size. [Author's summary.]

144. HESSE, C. O.

**Philp and Mabel, two new nectarines for California.**  
*Bull. Calif. agric. Exp. Stat.* 717, 1950,  
pp. 8, illus.

The two varieties described are illustrated by colour plates. Their phenological and physical characteristics are compared with those of John Rivers and Gower, the two most important commercial varieties in California.

**Morphology and growth.**

(See also 33, 247.)

145. BLASER, H. W., AND EINSET, J.

**Flower structure in periclinal chimeras of apple.**  
*Amer. J. Bot.*, 1950, 37: 297-304, bibl. 13,  
illus.

Observations of the pattern of diploid and tetraploid tissue in periclinal chromosomal chimaeras of apple flowers are used as a basis for reinterpreting the floral structure of the pome.—Univ. Wash., Seattle, and N.Y. St. agric. Exp. Stat., Geneva.

146. JOHNSEN, E. M., KENWORTHY, A. L., AND MITCHELL, A. E.

**Influence of spray materials on the structure of sour cherry leaves (*Prunus cerasus* L., var. Montmorency).**  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55:  
195-8, bibl. 3, being *J. Art. Mich. agric. Exp. Stat.* 1106.

In 1948 8 spray treatments in 3 combinations were applied on an ordinary pre- and post-blossom schedule to 4-year-old Montmorency cherries on Mahaleb stock. Leaves collected on 7 August showed marked differences in the depth of the palisade mesophyll.

Among 3 fungicides the depth of the palisade layer was greatest following the use of liquid lime-sulphur, slightly thinner following ferric dimethyldithiocarbamate, and significantly thinner following basic copper sulphate plus lime. Among 3 insecticides the depth of the palisade layer was significantly greater following the use of parathion than when either benzene hexachloride or lead arsenate was used; the effect of benzene hexachloride varied, however, according to the fungicide with which it was combined.

147. CONDIT, I. J.

**Fig characters as affected by climate.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**:

114-18, bibl. 17.

From a review of the literature and observations made on figs in coastal and interior districts of California, it is concluded that climatic conditions have marked effects on size and shape of fruit, colour of skin and pulp, and quality. The effect on parthenocarp is more difficult to determine, but it is pointed out that Croisic, which produces a very scanty second or mammoni crop in interior valleys, will give a good mammoni crop in favourable seasons in the cooler coastal areas.

148. ONO, M., MURAMASU, H., AND SHIRAKI, T.

**The time of flower bud differentiation in loquats.** [Japanese.]

*J. hort. Ass. Japan*, 1948, **17**: 1/2: 100-10,

bibl. 20, illus.

In this study of the flower bud differentiation in loquat, terminal buds of the current year's shoots were taken from trees in 1935 when 28 years old and in 1946 at 39 years. Twenty to thirty buds were taken at a time, the bud scales removed, the buds fixed in 70% alcohol and afterwards examined microscopically. The time of bud differentiation during both years was from the middle of July to the middle of August. From the flower bud initiation to the stamen phase took about 40 days, from the stamen stage to the initiation of ovules 10 to 20 days and from this to the ripening of the pollen about 30 days, the flower opening 10 to 20 days later. Thus the time from the beginning of differentiation to the opening of the flower occupies 90 to 110 days. The rate of development of the flower bud, after differentiation starts, varies with the plant's nutrition and environment. Thus in a favourable year like 1946, differentiation was relatively early and the developmental period shorter. About 40 days after differentiation the flower buds become swollen and more rounded than the vegetative buds, and when this difference has become noticeable externally the sexual organs are already formed.

149. MARINUCCI, M.

**Le infiorescenze dell'olivo. (Inflorescences of the olive.)**

*Ital. agric.*, 1950, **87**: 521-4, illus.

The inflorescences of the olive are of two types, one in which the axis is simple and bears opposed pedicels, except the terminal one, and the other with a principal axis with branches of the second and sometimes of the third order. The first type is illustrated by photographs of flowering branches of the varieties Leccino and Vera, and the second by Dolce Agogia.

150. RJADNOVA, I. M.

**The rest period of buds and fruiting in pears.** [Russian.]

*Agrobiologija* (Agrobiology), 1950, No. 1, pp. 130-4, illus.

Observations show that in the sub-tropical Black Sea coastal zone of the U.S.S.R. the frequent abnormal development of pears depends on the weather in winter, the intensity of dormancy, varietal peculiarities, and the period of fruit bud formation in relation to the conditions during the summer and autumn period.

**Propagation.**

(See also 102, 1236.)

151. THOMAS, P. H.

**Notes on the propagation of deciduous fruit trees in Tasmania.**

*Tasm. J. Agric.*, 1950, **21**: 83-94, illus.

A general account of methods of selection, raising of seedlings, budding, grafting, layering, and bench grafting, followed by specific directions for apricot, apple, cherry, plum, quince, and peach. The article ends with a note on *Prunus davidiana*, a native of China, which has been introduced as a peach rootstock to Tasmania. It is said to be healthy, hardy and vigorous, and lends itself readily to propagation by budding, which is an advantage in that peaches do not propagate readily by grafting.

152. NICKELL, L. G.

**Crabapples from seed.**

*Brooklyn bot. Gdn Rec.*, 1950, **6**: 123-5, illus.

To hasten crab apple seed germination, an embryo culture was used in the Brooklyn Botanic Gardens, thus gaining perhaps 2 years in the development of the plant. The hard covering of each seed together with its inner lining was removed, the embryos were transferred to test tubes containing a nutrient, and kept at 70° F. in a culture room in constant light. Germination started within 2 days, and after 4 weeks the plants, each with 4-6 leaves, were transferred to soil in pots in a greenhouse. After 3 months' growth there, they became dormant for a month, after which vigorous growth was renewed. This second growth period corresponded to ordinary second-year growth, but none of the "first-year" leaves was lost.

153. FEDOROV, M. A.

**Olive propagation trials.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 64-7, illus.

In Azerbaijan propagation by cuttings and by etiolated shoots was found equally effective. The cuttings (green, semi-hard and hardwood) were taken in May or from August to November, and were treated with growth substances. Two types of solution were used: (a) different concentrations per litre of water of  $\beta$ -indolebutyric acid, vitamin B<sub>1</sub>, and malt and beer yeast for all three types of cuttings; (b) 200 mg. heteroauxin, 700 mg. malt, 300 mg. dry beer yeast and 20 mg. vitamin B<sub>1</sub> per litre of water for green and semi-hardwood cuttings. After treatment they were set in sand in hot beds, and produced roots within 15-25 days and were ready for transplanting in 40-60



days. 60 to 65% rooting was obtained. Etiolated cuttings were taken from 2-year-old wood throughout the year except from mid-April to mid-July, and were laid in damp sand and kept at 20-30° C. 75 to 90% rooting was obtained by this method, with 3 to 4 rooted plants from every parent shoot.

154. OZEROV, G. V.  
Presowing treatment of olive seeds. [Russian.]  
*Agrobiologija* (Agrobiology), 1950, No. 1,  
pp. 116-22.

In sowing olive seed direct in the open ground germination is delayed for 2 years or more and percentage germination is low. Various methods of obviating this difficulty are mentioned, and data are presented to show the favourable effects of caustic potash, mechanically injuring or removing the shell, and removing the tip of the shell with special pincers. The date of sowing affects germination, the best results being obtained from sowing in November.

155. GARNER, R. J.  
Grafting in the garden.  
*Fruit Year Book*, 1950, pp. 19-27, illus.

Some methods of grafting other than those commonly used in the nursery are concisely described and clearly illustrated. These include the stub, side, and inverted-L grafts for re-working mature trees, the bridge graft and inarching for rehabilitation, and the bottle graft, which is a useful method of saving a valuable scion during the growing season.

156. GRAVES, G.  
Double working, the art of setting graft upon graft.  
*Nat. hort. Mag.*, 1950, 29: 118-27, bibl. 67.

An interesting and entertaining review of the literature, classical and modern, on double working to provide intermediate stem-pieces, pollinating branches, etc., particularly in deciduous fruits. The questions of stock-scion interrelationships and incompatibility are considered in some detail.

### Rootstocks.

(See also 103, 307, 331, 1212, 1214, 1221, 1232, 1233.)

157. MANARESI, A.  
Il problema dei portainnesti nelle piante arboree da frutto. (The problem of fruit tree rootstocks.)  
Reprinted from *Att. III Congr. naz. Fruttic.*,  
*Ferrara*, 1949, 1950, pp. 73, bibl. 550.

The author, who for many years has been pre-eminent among Italian pomologists, gives an extremely well documented survey of the work on rootstock problems, with particular reference to methods of propagation for apples, pears, quinces, plums, peaches and cherries. He cites with exact authority in each case precise practical results, most of them being reported from England, U.S.A., the Dominions, Holland and Germany, together with a few recent instances from Russia. [As a summary of practical experience it seems to us quite the most complete yet seen.]

158. JOHANSSON, E.  
Sort- och grundstamförsök med äpple II vid Alnarp. (Apple variety and rootstock trials at Alnarp, Sweden, II.) [English summary 1 p.]  
*Medd. Trädgårdsförs. Malmö* 59, 1950, pp. 10, bibl. 2.

For an abstract of the first paper under the same title, see *H.A.*, 17: 1168. The present paper is a preliminary report of a rootstock trial carried out on a good loam soil with the apple varieties Cox's Orange, Yellow Richard and Laxton's Superb on EM. IX, IV, XIII and the Swedish clonal stock A2. In 1949, i.e. 10 years after planting, trees of all varieties were larger on A2 than on any of the Malling stocks. The following total yields were recorded (in kg.) during the period 1942-49 for Cox's Orange and Laxton's Superb respectively: on EM. IX=68.6, 70.9; on IV=82.3, 87.2; on XIII=46.6, 101.3; and on A2=101.3, 141.1. The results show that under Swedish conditions A2 is a very suitable rootstock, especially for weak-growing varieties, and could in most cases replace other vigorous clonal stocks. Precocity, fruit drop, fruit size and fruit colour are among other observations briefly discussed.

159. GAVRILOV, N. V.  
Provision of Siberian apple and reinette seeds. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 20-1.

The success of fruit growing in the northern and eastern parts of Russia depends largely on hardy rootstocks, which should preferably be of local origin. Seedling rootstocks are normally used; and the harvesting of their fruits and the cleaning, drying and storing of the seeds are described.

160. KARNATZ, H.  
Die Ausbeute an Sämlingsunterlagen bei sortenreinen Kernobstsäaten. (Seedling rootstock production from pome fruit varieties.)  
*Mitt. ObstbVersuchsring Jork*, 1950, pp. 111-12.

This article gives some figures of rootstock production from 1 kg. apple seed of different varieties. Trierer Weinapfel had the highest number, i.e. 36,100 seeds per kg., of the varieties examined, and also the highest number of harvested plants, while the Litauer Pippin had the lowest number, 20,900 seeds, and produced correspondingly fewer plants. Some varieties produced more vigorous seedlings with wide, others with close, spacing. On an average, 7,300 seedlings were produced from 1 kg. apple seeds, and 7,100 from 1 kg. pear seeds.

161. BLAIR, D. S.  
Experiences with hardy stocks for apples.  
*Proc. VI St. hort. Soc.*, 1950, 54: 7-12.

Following serious losses from winter injury, trials were started in 1935 at Ottawa, Ontario, to find suitable stem builders. The ideal stem builders should be: fully hardy, mechanically strong to support heavy crops, compatible with all commercial varieties, and resistant to diseases. To date some 60 varieties have been

tested, of which Antonovka, Hibernál, *M. robusta* No. 5 (a clonal rootstock), Osman, Columbia and Virginia Crab were found most promising. Satisfactory trees of Melba, McIntosh, Lawfam, Sandow, Spy and many other varieties have been grown using stem builders, notably Hibernál and Antonovka. At 12 years of age cumulative yields of McIntosh on Hibernál intermediates were equal to those from single-worked trees. Virginia Crab has proved to be incompatible with some commercial varieties and shows slight susceptibility to crown rot and fire blight. The most economical method of top-working trees is by budding, and most satisfactory results are achieved when the operation is carried out over 2 or 3 years. Records of rootstock trials in progress since 1895 show that seedlings of varieties of crab, such as Quaker Beauty, Martha, Transcendent and Hyslop, and the hardy Russian varieties, such as Antonovka and Beautiful Arcade, are thoroughly frost resistant. In clonal rootstock trials Malling stocks were found tender and of doubtful value under Eastern Ontario and Quebec conditions. Out of these investigations one outstanding clonal rootstock, the *M. robusta* No. 5, has emerged.

162. EVREINOFF, V. A.  
Manzanilla. (*Crataegus mexicana* Moçino and Sessé.)  
*Fruits d'Outre Mer*, 1950, 5: 241-3, bibl. 1, illus.

In the author's view *Crataegus mexicana* is a valuable fruit tree which merits introduction into Metropolitan France and its North African dependencies. Observations in Mexico suggest that the species may be of interest as a rootstock for apple, pear and quince.

163. ROSELLA, E.  
L'importance du choix des porte-greffes dans le cas du cerisier en particulier.  
(Cherry rootstocks resistant to capnodis.)  
*Rev. hort. Paris*, 1950, 122: 182-3.

It is estimated that in Morocco about 34% of all sweet cherry trees are infested with *Capnodis tenebrionis*. Observations suggest that on heavy, irrigated soil the rootstock Sainte-Lucie, commonly used where small trees are wanted, is especially liable to attack by the beetle. The author recommends that sour cherry or, where large trees are required, mazzard be used in place of Sainte-Lucie in these areas.

164. SANNIKOV, V. S.  
The influence of the rootstock on the quality of plums. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 47-50, illus.

Results given were obtained from trees of 6 varieties of plum worked on 3 other varieties of *Prunus*, viz. a Canadian plum, an Ussuriensis plum and *P. besseyi* (sand cherry). The conclusion is drawn that the rootstock has a marked influence on certain characters of the scion, such as size and flavour of the fruit, thickness of skin, and yield. The work was carried out at Čeljabinsk (east of the Urals) where plum growing is comparatively new.

## Pollination and bees.

(See also 2341, 448, 848, 1192.)

165. ALMEIDA, C. R., MARQUES DE.  
Ainda acerca da improdutividade na amendoira. (A further study of unfruitfulness in almonds.)  
*An. Inst. sup. Agron. Lisbon*, 1948-49, 16: 51-71, bibl. 2.

The compatibility studies with almond varieties which were made at the Sotavento Agricultural Station, Algarve, in 1941-45 [see H.A., 18:182] have been extended to include a further 21 combinations, many of them varieties imported from Spain. In this new series of experiments, the degree of compatibility of 53 combinations was determined by observations of (1) the percentage of ripe fruit resulting from artificial pollination, and (2) the rate at which the pollen tube grew towards the embryo-sac. Detailed results are tabulated. It was not found possible to determine the nature of the allelomorphic factor responsible for incompatibility, as insufficient cases of self-incompatibility and inter-incompatibility were observed.

166. DÍAZ, J. R.  
Desarrollo del tubo polínico en pistilos de manzanos, en flores autopolinizadas y en polinizaciones cruzadas recíprocas de las variedades Delicious y King David. (Development of the pollen tube in the styles of self-pollinated or reciprocally cross-pollinated flowers of the apple varieties Delicious and King David.)  
*Rev. Agron. B. Aires*, 1949, 12: 318-39, bibl. 51, illus.

The following results were obtained from investigations carried out at the Instituto de Frutivicultura, Buenos Aires. The rate of penetration of the pollen tubes was greatest during the first 24 hours following pollination; thereafter it decreased progressively. In compatible cross-pollinations the pollen tubes developed more rapidly than in self-pollinations, the difference being greatest during the first 24 hours. In contrast to observations made on cross-pollinations of other compatible species, the rate of penetration did not increase as the pollen tube approached the ovary. No characteristic differences were observed in the appearance of the tip of the pollen tubes in self- and cross-pollinations. It is not considered possible at present to determine accurately the degree of compatibility in different combinations of apple varieties by means of observations on the development of the pollen tubes within the style.

167. MARRIOTT, P. F.  
Pollination of plums.  
*J. Dep. Agric. Vict.*, 1950, 48: 415-16, illus.

Japanese varieties tested included Narrabeen, Santa Rosa, Formosa, Satsuma, Wickson, October Purple, and Climax. Climax blossoms much later than the other varieties and thus misses their main flowering periods, but, as it is comparatively self-fruitful, cross-pollination is not essential. Tests with all combinations of the other varieties showed that all are compatible with each other. European varieties included King Billy, Angelina, Diamond, Grand Duke, President, and



Green Gage. All of these except Green Gage flower close enough together for mutual cross-pollination. Coe's Golden Drop flowers about the same time as Green Gage and is compatible with it.

168. CAMBRA, M.

Ensayos sobre polinizaciones artificiales en ciruelo "Reina Claudia Verde". (Pollination trials with the greengage.) [English summary  $\frac{1}{2}$  p.]

An. Estac. exp. Aula Dei, 1950, 2: 1: 72-5, bibl. 4.

In trials carried out at the Aula Dei Experimental Station, Saragossa, artificial self-pollination of green-gage resulted in only 2.4% fruit set and open self-pollination in 3.45%. Cross-pollination with "Claudia de Tolosa" and "Cascabel", however, gave excellent sets, i.e. 21.85% and 28.57% respectively.

169. BROWN, A. G.

Factors affecting fruit production in plums.

Fruit Year Book, 1950, pp. 12-18, bibl. 4, illus.

Some self-incompatible varieties of plum, even when suitably interplanted with pollinators, may sometimes be very irregular croppers. A study of the behaviour of pollinating insects and of flower structure was made in an attempt to throw some light on the causes of this irregularity. It was observed that hive bees never collect nectar and pollen on the same visit, and that they are more efficient as pollinators of plum blossoms when collecting pollen. Wild bees and blowflies, although present in smaller numbers, are very efficient cross-pollinators by reason of their wandering habits and the fact that they usually make contact with the stigma even when collecting nectar. Some varieties appeared to be much more attractive than others to hive bees, about 4 times as many bees, for example, being observed on Utility as on Jefferson, although both were in full flower. Measurements of the amount of nectar secreted by the blossoms of a number of varieties indicated that an abundance of nectar is one of the factors which determines the number of bees attracted to a tree. High nectar-producing varieties, moreover, continue to produce it in quantities likely to attract bees for a longer period than low nectar-producing varieties, and they are also more attractive to bees collecting pollen. The unreliable cropping of President is shown to be due not only to the low nectar yield but also the position of the stigma, which projects so far above the stamens that hive bees are able to collect both pollen and nectar without touching it. It is concluded, therefore, that hive bees are of practically no importance in the cross-pollination of this variety, and where a good set is obtained it is probable that there is a large population of wild bees in the neighbourhood. The same applies to the variety Jefferson. Old Greengage, on the other hand, has an abundance of nectar, and the style is of about the same length as the stamens; cross-fertilization, however, is irregular because the stigmas become covered with incompatible pollen from the same tree so rapidly that compatible pollen brought to the stigmas later is likely to have a reduced chance of germination.

170. KREMER, J. C.

The dandelion and its influence on bee behavior during the fruit blossoming period.

Proc. Amer. Soc. hort. Sci., 1950, 55: 140-6, bibl. 4, illus., being J. Art. Mich. agric. Exp. Stat. 1151.

From studies over 10 years at East Lansing, Michigan, it is concluded that dandelions, *Taraxacum officinale* L., in the vicinity of orchards may influence bee activity and compete with fruit blooms to some extent, but that this is not necessarily responsible for lack of activity on fruit bloom or a light set of fruit.

171. WEAVER, N.

Toxicity of organic insecticides to honeybees: stomach poison and field tests.

J. econ. Ent., 1950, 43: 333-7, bibl. 5, being Tech. Contr. Tex. agric. Exp. Stat. 1300.

A report on laboratory and field trials in Texas, conducted to ascertain the toxicity of BHC, DDT, chlordane and toxaphene to bees. The safest of the insecticides in the field was 20% toxaphene-40% sulphur. 10% DDT-40% sulphur and 10% chlordane-40% sulphur were more toxic, but deaths were still not high. Bees were repelled for about 3 hours following applications of 3%  $\gamma$ -BHC-5% DDT-40% sulphur, and mortality was slight. Reports from bee keepers, however, indicate that insecticides containing BHC may be highly toxic under certain conditions. Preliminary tests indicate that parathion may be more toxic to bees than any of these materials. None of the organic insecticides tested is as destructive to bees, when used in the field, as is calcium arsenate.

172. HOCKING, B.

The honeybee and agricultural chemicals.

Bee World, 1950, 31: 49-53, bibl. 44.

A review of the effect of fertilizers, weedkillers, fungicides and insecticides on the health and behaviour of bees. The influence of insecticides and weedkillers is dealt with in detail, and tabulated data are presented on the danger to bees arising from the use of certain insecticides.

Soil management.

(See also 234f, h, k, 309, 319, 487, 488, 1226.)

173. SPIRHZANZL, J.

Půda—základ zemědělství. (Soil—the basis of agriculture.)

Rádce Zemědělece 107, Prague, 1948, pp. 149, illus., Kčs 45.

This illustrated booklet is one of a series of practical manuals written for Czech farmers. In an introductory section the subjects dealt with vary from the names and addresses of advisory organizations, chiefly research stations, to soil erosion. The second part is devoted to fertilizers and their use on light, medium and heavy soils and to soil management in general. The last chapter, "Soil and the fruit tree", enumerates briefly the soil requirements of apples, pears, sweet and sour cherries, plums, apricots, peaches, walnuts and hazel nuts.

174. RUBIN, S. S., and KRASNOŠČEK, I. F.

The depth of cultivation before orchard planting. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 9, pp. 8-11, bibl. 1.

Deep ploughing to 40 cm. followed by 60 cm. sub-soiling, or a 60 cm. deep ploughing was found to be the best form of soil preparation in an apple orchard in the Ukraine. Deep ploughing is also recommended in young established orchards to induce new root development and deeper rooting, and to make it possible to apply fertilizers near the developing young roots.

175. RUBIN, S., AND GORBATJUK, D.  
The depth and the date of soil cultivation in orchards. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 37-41, bibl. 2.

Results of experiments indicate that 22 cm. deep ploughing, in spite of damaging the root system, resulted in an increased yield of apples of the variety Snowy Calville. Damage to roots caused by ploughing at various depths and rates of regeneration are given for different soil types. The optimum time for late ploughing in orchards is considered to be when the leaves turn yellow, i.e. 20-30 days before leaf fall, which allows the damaged roots to callus over before dormancy sets in.

176. EMBLETON, T. W., AND BOYNTON, D.  
Some effects of spray residues on the pH and the basic cations of the soil, in north-eastern McIntosh apple orchards.  
*Proc. Soil Sci. Soc. Amer.* 1949, 1950, 14: 105-9, bibl. 10.

The indirect effect on the soil of sulphur, lime-sulphur and Fermate spray programmes were studied at Cornell. The soil under trees where Mg deficiency symptoms appeared, averaged pH 3.9 and was very poorly supplied with exchangeable and soluble Ca and Mg. Liming induced a vigorous growth of volunteer grass where the soil was previously free of vegetation. In an orchard soil which had limestone particles throughout the profile, only slight differences existed in the pH and basic cation content in the soil under trees sprayed with sulphur and lime-sulphur for 10 years. Sulphur sprays were associated with distinctly higher soil acidity and lower calcium content than were the Fermate sprays. In all orchards observed the soil under the trees was more acid than in the spaces between the trees, particularly where the sulphur sprays were used. This was associated with lower Ca content, a lower "% base saturation" and a lower Mg: K ratio in the soil. A low Mg: K ratio in the soil was associated with Mg deficiency of apples. [From authors' summary.]

177. OVERLEY, F. L.  
Cover crops in apple orchards on arsenic-toxic soils.  
*Bull. Wash. St. agric. Exp. Stats* 514, 1950, pp. 14, bibl. 17.

Arsenic in the surface soil was found to be toxic to cover crops, particularly legumes, in orchards persistently sprayed with lead arsenate. The application to such soils of 1,000 to 1,500 lb. of 16% superphosphate per acre was effective in establishing a stand and growth of alfalfa after a year, but other fertilizers were of little or no use. Wheat straw particularly when supplemented with sodium nitrate, and applications of 5 to 7 tons per acre of dry cow manure were effective in

the establishment of alfalfa. Common grasses in general proved to be more tolerant of arsenic in the soil than legumes or cereals, except possibly rye. Lists are given of legume, cereal and grass varieties showing their tolerance to arsenic.—Tree Fruit Experimental Station, Wenatchee.

178. ABDULLAEV, A. G.  
Leguminous cover crops in the orchards of Azerbaijan. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 42-5, illus.

During trials in fig and almond plantations, the beneficial effect of autumn-sown leguminous cover crops was ascertained. For the dry sub-tropical parts of Azerbaijan peas and vetches are recommended, for the moist sub-tropical areas horse beans, lupins and *Crotalaria*.

179. BELL, H. K.  
Trends in soil management in peach orchards.  
*Bett. Crops*, 1950, 34: 7: 13-17, 39, illus.

Notes on planting, cover crops and nutritional disorders in peach orchards with special reference to New Jersey conditions.

180. OLNEY, A. J., LOWRY, S. J., AND CALDWELL, L. M.  
Effect of cover crops and tile drainage on the growth and yield of peaches.  
*Bull. Ky agric. Exp. Stat.* 547, 1950, pp. 8.

Studies are described on peaches grown in Kentucky on a site subject to frequent frost damage and in soil with insufficiently rapid natural drainage in wet seasons. Tile drains were put in, but in the drier seasons that followed they proved of little value except in isolated wet patches. In cover cropping experiments a permanent cover of lespedeza sod gave outstandingly good results, the trees making as good growth in these as in cultivated plots once they had reached maturity. The use of certain annual covers gave good results during the first 3 or 4 years, but continued cultivation with these crops resulted in soil depletion and erosion.

### Irrigation.

181. VEIHMEYER, F. J., AND HENDRICKSON, A. H.  
Responses of fruit trees and vines to soil moisture.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 11-15.

General conclusions drawn from a large number of experiments in California [described previously] are here summarized. They have shown that trees can obtain a supply of water with equal facility between the field capacity and the permanent wilting percentage, and that size and quality of fruit will not be affected adversely unless the moisture content is reduced to the permanent wilting percentage for periods exceeding a few days. The commonly-held idea that the quality of irrigated fruit is lower than that of non-irrigated fruit has been found to be erroneous. The idea that drought resistant species such as the olive and fig can extract water from the soil below the permanent wilting percentage has also been shown to be wrong; drought resistance merely represents the capacity to withstand the harmful effects of water shortage for relatively long periods without serious injury.



182. MORITA, Y., AND YONEYAMA, K.  
Studies on physical properties of soils in relation to fruit tree growth. III. Soil moisture and tree growth. (1) Effects of soil moisture on the growth of peach, pear and persimmon seedlings. [Japanese.] *J. hort. Ass. Japan*, 1949, 18: 155-65, bibl. 21, illus.

Peach, pear and persimmon seedlings were grown in pots, details of the soil used, water supply, and weights of the plants being given. The conclusions drawn from the results obtained are: (1) no particular water supply was perfect for all parts of the plant, but about 20% soil moisture proved best for the development of branches and 30-40% for the plant as a whole; (2) from 50% upwards the results were generally injurious; (3) the moisture rate at which the seedlings started to wither was 8.5% for pear, 7.6% for peach, and 11.6% for persimmon; (4) peach is considered to be relatively drought resistant, but it was shown that it can tolerate higher soil moisture than pear or persimmon. Pear and persimmon at all moisture rates showed equal development of stem and root. Only peach, under conditions of water deficiency, developed a root system heavier than the above-ground parts. With 40% moisture around the basal part, peach roots developed small spots, which were absent from persimmon roots. Pear showed only a few spots, at from 45% moisture upwards. At 50% the main roots turned dark and rotted, pear showing the highest rate of decay.

183. WILCOX, J. C.  
Sprinkler irrigation experience in British Columbia orchards. *Sci. Agric.*, 1950, 30: 418-27, illus., being *Contr. Div. Hort. Dep. Agric., Ottawa*, 739.

About 30% of the orchards in British Columbia are now irrigated by means of low pressure, under-tree rotary sprinklers. By comparison with furrow irrigation, the sprinkler method has brought about a marked reduction in soil erosion. It has also induced better growth of cover crops, made orchard operations easier to perform, provided more satisfactory soil moisture conditions, saved water and labour, and reduced difficulties from seepage water. On the other hand, some difficulty has been encountered from increased brown rot of peaches, fire blight of pears and splitting of cherries and apricots. Operational procedures are discussed and cost comparisons are made with furrow irrigation.

184. HENDRICKSON, A. H., AND VEIHMAYER, F. J.  
Irrigation experiments with apricots. *Proc. Amer. Soc. hort. Sci.*, 1950, 55: 1-10, illus.

Four irrigation treatments were applied to 8-year-old Royal apricots on apricot stock growing on silty loam soil at Winters, California, where generally the winter rainfall provides enough moisture to last until after harvest in late June or early July. The treatments which started in 1947 were: (A) irrigation once before harvest, and after harvest whenever soil moisture in the top 3 feet fell to about 15%, (B) irrigation immediately after harvest and again whenever soil moisture fell to about 12%, which is close to the permanent wilting

percentage, (C) irrigation once only immediately after harvest, and (D) no irrigation. Yields and growth, as measured by gains in cross-sectional areas of the trunks, were recorded in the 3 years preceding differential treatments and in the 3 years during which the treatments have so far been applied; soil moisture data were recorded in the 3 seasons of the experiment. Yield records have shown no response to the application of water before the crop ripened, but in three cases out of four yields were increased by irrigation during the preceding season as compared with treatments which allowed the trees to remain at the permanent wilting percentages for relatively long periods. Variations in response as between seasons, however, emphasize the danger in attempting to draw conclusions from yield data in relatively short-term experiments of this type. Trunk growth records indicate that the trees were apparently influenced by shortage of readily available moisture during the same season that the measurements were taken.

### Nutrition.

(See also 1208, 1217, 1227.)

185. SKEPPER, A. H.  
Fertilizers for fruit trees on the Murrumbidgee Irrigation Area. *Agric. Gaz. N.S.W.*, 1950, 61: 125-8; 130, 183-7, bibl. 7, illus.

The basic principles underlying the use of fertilizers for fruit trees are discussed. Observations made over many years, and research results are incorporated into a fertilizer programme for the Murrumbidgee Irrigation Area orchards. Attention is drawn to the symptoms of various deficiency disorders.

186. PRIIMAK, A. K.  
Fertilizers as means of increasing orchard yields in the Kuban. [Russian.] *Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 10-17.

Results of fertilizer trials conducted between 1936 and 1948 in orchards on the rich soils of the Kuban showed considerable responses. Organic fertilizers, particularly bird- and liquid-manure were the most effective, though the need for mineral fertilizers was also indicated. Of methods of application tested, nutrients supplied through 25-40 cm. deep holes around the trees, or through 25-30 cm. deep furrows on both sides of the trees gave excellent results.

187. CHOUARD, P.  
La fertilisation des arbres fruitiers. (Fruit tree manuring.) *Jardins Fr.*, 1950, 4: 65-72, illus.

With special emphasis on the French method of manuring fruit trees by the injection of liquid fertilizers into the soil.

188. BOULD, C.  
Methods of applying nutrients to fruit trees. *Fruit Year Book*, 1950, pp. 96-9, illus.

Three methods are described and evaluated: subsoil injection of liquid fertilizers, solid injection of stems and branches, and foliage sprays.

189. FISHER, E. G., AND COOK, J. A.  
**Nitrogen fertilization of the McIntosh apple with leaf sprays of urea II.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 35-40, bibl. 1.

In Western New York the following 6 treatments were applied to bearing McIntosh trees: nil,  $1\frac{1}{2}$ , 3 and 6 lb. uramon per tree applied to the soil, 3 sprays of NuGreen urea (calyx, first and second cover, totalling 2-4 lb.) and 4 sprays NuGreen (2 pink bud, calyx and first cover, totalling 3 lb.). In 1948 the experiment was made at 3 locations with a total of 54 replications; in 1949 it was repeated at 2 locations with a total of 40 replications. By June both spray treatments resulted in higher N and chlorophyll levels in the leaves per unit N applied than did the soil applications, but this difference disappeared by harvest time. The 3-spray treatment in 1948 increased fruit set and total yield as compared with a comparable soil application. In 1949 the sprayed trees carried reduced bloom, but fruit set was again increased and hence the yield was similar to that obtained with the soil application. In both years the 4-spray treatment gave similar yields to the comparable soil treatment. No differences in fruit colour were observed. It is pointed out that these results are not in close agreement with those for 1947 [see *H.A.*, 18: 2465] and further trials are to be made.—Cornell University.

190. BOWMAN, F. T., AND DAVISON, J. R.  
**Preharvest drop of d'Agen prunes on the Murrumbidgee irrigation areas. The results of investigations, 1941-49.**  
*Agric. Gaz. N.S.W.*, 1950, **61**: 23-5, 40, 93-8, 361-4, bibl. 3, illus.

Details are given first of exploratory trials to investigate the use of fertilizers and the effects of salt on the incidence of preharvest drop of d'Agen prunes. Results of an orchard experiment indicated that the extent of "drop" was related to maintenance of vigour in the trees by pruning, soil management, irrigation, and disease control. The correct method of pruning the young prune trees is outlined and illustrated.

### *Composition.*

(See also 234c.)

191. FAKUDA, A., AND KUROI, I.  
**Seasonal changes of starch content in the shoots of some deciduous fruit trees (grape, peach, pear and persimmon).** [Japanese.]  
*J. hort. Ass. Japan*, 1949, **18**: 150-4, bibl. 8.

Sample shoots were collected twice monthly from May till November from persimmon, pear and peach trees, 1, 2 and 3 years old, and from vines, 1 and 2 years old. Chemical and microscopical examinations were made. The samples were treated in a solution composed of equal amounts of glycerine and alcohol (95%) and stained with potassium iodide. The trees showed twice yearly a minimum and a maximum starch content, the minima in mid-winter and at time of vigorous growth, and maxima during leaf fall and preceding flowering. The rhythm of starch decrease in the tissues as well as the time needed for storing starch was not clear, but there was evidence that the sieve tube layer may be regarded as the starting point.

The decrease of starch takes place in a centrifugal movement towards the cortex and, reaching the external tissue, turns in a centripetal movement. The increase movement is in the opposite direction to that of the decrease. Regarding the rate of decrease and increase of starch it was clear that nearer the formative cambium layer the decrease is quicker and the increase slower. Even in the periods of minimum contents, starch was always found accumulated outside the pith and in the sheath. No obvious differences were found in the shoots from trees of different ages. The times of minimum and maximum accumulation are different for each of the species examined. Peach and pear show their minimum contents 2 weeks earlier than persimmon and vine.

192. KENWORTHY, A. L.  
**Nutrient-element composition of leaves from fruit trees.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 41-6, bibl. 4, being *J. Art. Mich. agric. Exp. Stat.* 1112.

Between 15 July and 15 August, 1948, leaf samples were collected from 100 blocks of fruit trees located in different parts of Michigan. Six varieties were represented, namely McIntosh and Jonathan apples, Elberta and Halehaven peaches, Montmorency cherry and Bartlett pear. The trees were selected as showing no symptoms of either deficiency or excess of minerals. Average, high and low values found by analysis are tabulated for N, P, K, Ca, Mg, Mn, Fe, Cu and B. The leaf analyses indicate that there are distinct differences not only between species of fruit but between varieties for several elements. The two apples showed significant differences in contents of P, Fe and Cu, and the two peaches in P, Mn, Fe, Cu and B. Only K values showed no characteristic differences between either species or varieties. These results are discussed in the light of concepts of "optimum" nutrient values and nutrient-element balances.

193. BEATTIE, J. M., AND ELLENWOOD, C. W.  
**A survey of the nutrient status of Ohio apple trees.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 47-50, bibl. 8.

Between 12 July and 5 August, 1948, leaf samples were taken from 47 orchards in Ohio and analysed for N, Ca, Mg, K, B, Fe and Mn. The results indicate that in orchards where N fertilizers were used, leaf N was higher and Mg tended to be higher while K was lower than where no N had been supplied. The highest and lowest values found for each element are tabulated for two varieties. The lowest values for N, K, Mg and B may indicate possible deficiencies of these nutrients, although with the last three no deficiency symptoms were seen.

194. THOMAS, F. B., AND WHITE, D. G.  
**Foliar analyses of four varieties of peach rootstocks grown at high and low potassium levels.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 56-60, bibl. 11, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1550.

Seedlings of 4 peach rootstock varieties, Shalil, Muir, Lovell, and J. H. Hale, growing in sand culture received



nutrient solutions low and high in K. With low K the leaves of the seedlings contained significantly less K and more P and Ca and formed fewer growing points than with high K. Leaf analyses showed no significant differences in the amounts of N, P, K, Ca and Mg among seedlings of the same variety, but there were significant differences between the varieties. For most elements the highest percentages occurred in Muir, though seedlings of this variety were the smallest in size. The other varieties in descending order of "intensity of nutrition" were Shalil, Lovell and J. H. Hale.

195. MANCINI, F.

**Fruit and vegetables in nutrition.**

*Food and Agric.*, 1950, 3: 75-7.

Tables are included showing the calorific values, vitamin contents, and Ca, P, and Fe contents of the commoner fruits and vegetables.

196. PEYNAUD, E., AND MAURIÉ, A.

La vitamine C dans les fruits à noyaux de la récolte 1949. (The vitamin C content of stone fruits harvested in 1949.)

*Rev. hort. Paris*, 1950, 122: 24-6, 52-3, bibl. 7.

Data are tabulated for 44 peach and 50 plum varieties on fruit weight and the ascorbic acid content per 100 g. fruit (and juice in the case of peach). A comparison of the figures for 1947 and 1949 shows that the average vitamin C content of peaches was 25% higher in 1947. Smaller size in peaches was associated with a relatively higher vitamin C content. The relationship between ascorbic and citric acid contents in fruits generally is discussed.

197. LISO, A.

Differenza fra l'olio di olive normali e quello di olive partenocarpiche della varietà "Coratina". (Differences in the oil of normal and parthenocarpic fruits of the olive variety Coratina.)

*Olearia*, 1950, 4: 228, and *Olivicoltura*, 1950, 1: 8-10, from abstr. in *Oléagineux*, 1950, 5: 683.

The two oils are not very different in character, a fact which indicates that the process of fertilization does not modify the physicochemical constants of the fatty substances.

*Spraying to thin or retain fruit.*

198. FRITZSCHE, R., AND STOLL, K.

Regulierung des Fruchtansatzes an Apfelbäumen mit Hilfe von Spritzmitteln. (Controlling the fruit set in apples by means of sprays.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 438-42, illus.

The covering of the stigmata by a 0.1-1.0% oil-wax emulsion, applied at full bloom, proved to be an unreliable method for reducing fruit set in apples, especially in the varieties Gravenstein and Boskoop. Spraying with 0.0010-0.0075% naphthaleneacetic acid between full bloom and 3 weeks after, however, had the desired fruit thinning effect, if concentration and time were chosen correctly according to variety, Boskoop for instance requiring 0.0050% at full bloom.

This variety yielded an optimum crop if 18 fruits were left per 100 flower clusters, while Gravenstein needed 26 fruits per 100 clusters. In most cases the fruit drop induced by the hormone occurred 10-21 days after the treatment. The trials were carried out in 6 different areas on 70 trees, half of the top of each being left unsprayed as the control. The marked effect of thinning on quality is evident from photographs illustrating fruit samples from treated and untreated halves and from the tabulated differences in fruit weight. Other data presented relate to the number of fruits per 100 flower clusters 3 weeks after full bloom and at harvest, to the size of the crop and to the percentage of high-grade fruit. Further trials are necessary before more definite recommendations can be made.

199. VERNER, L., AND FRANKLIN, D. F.

**Chemical thinning of apples in Idaho.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 119-26, bibl. 7, being *Res. Pap. Idaho agric. Exp. Stat.* 307.

Experiments over 5 years are described in which Elgetol 30 (30% sodium dinitro cresylate with no detergent) was applied as a drenching spray to 3 irrigated apple varieties when in full bloom or within 3 days of that time. With Rome Beauty concentrations of 1½ to 1¾ pints per 100 gal. gave consistently good results, fruit size being increased by 22% to 73%, and the yield over a 2-year period being increased in one instance by 50%. With Delicious, results were erratic and in some cases deleterious. With Jonathan in 4 tests over 3 years good responses were obtained from concentrations of 1½ to 2½ pints per 100 gal. With few exceptions no differences occurred in the amount of thinning with the different concentrations used. Equally satisfactory thinning resulted from sprays applied at any time over a period of several days.

200. MURNEEK, A. E.

**The relative value of hormone sprays for apple thinning.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 127-36, bibl. 12, being *Contr. J. Ser., Dep. Hort., Mo. agric. Exp. Stat.* 1185.

Experiments in four years are reported on the use of hormone sprays to thin apples of several varieties in Missouri. Three materials were used: the sodium salt of naphthaleneacetic acid (NA), Elgetol containing 20% sodium dinitro cresylate+14% penetrant, and DN-1 consisting of 40% dinitro-ortho-cyclohexylphenol. All three appear to be satisfactory for the purpose, although, owing to the many factors that affect fruit set, the results cannot always be predicted with certainty. As NA can be used from one to several weeks after full bloom it would seem to be preferable to the two DN sprays which have to be applied during the blossoming period. There are indications that biennially bearing varieties in their on year may need higher concentrations of spray materials for thinning than do annual bearers. Some varieties, e.g. Jonathan and Winesap, seem to be more sensitive to thinning chemicals than others, and with Jonathan there is some evidence that the fruit increases in sensitivity for 2 weeks after the calyx stage and then decreases again. Where thinning is done early enough the trees generally produce larger fruit and may yield

more than hand-thinned trees, and such fruit usually matures earlier and has a higher sugar content and better colour.

# 201. BLAIR, D. S.

## Use of chemicals in apple production.

*Progr. Rep. Div. Hort. centr. exp. Farm, Ottawa, 1934-1948, 1950, pp. 51-8, bibl. 2.*

*Thinning apples with chemicals* offers a means of modifying the biennial bearing habit. Results of experiments conducted at several centres in Ontario are reported. Since seasonal conditions have an effect on the degree of thinning and varieties do not react alike, no definite rates of applications are recommended, though for trial purposes the dinitro compounds are suggested for use at the rate of  $1\frac{1}{2}$  pints or  $\frac{1}{2}$  lb. per 100 gal. and the hormone sprays at 5 oz. per 100 gal. *Harvest sprays.* The standard recommendation for controlling pre-harvest drop of apples is either naphthaleneacetic acid, the sodium salt of naphthaleneacetic acid or naphthaleneacetamide, all at 5 oz. per 100 gal. The same rate of 2-methyl-4-chlorophenoxyacetic acid also appears to be promising for McIntosh.

# 202. HARLEY, C. P., MARTH, P. C., AND MOON, H. H.

## The effect of 2,4,5-trichlorophenoxyacetic acid sprays on maturation of apples.

*Proc. Amer. Soc. hort. Sci., 1950, 55: 190-4, bibl. 5, illus.*

In experiments with several apple varieties in 1948 and 1949, 2,4,5-T at 50, 75, 100 and 200 p.p.m. sprayed on to fruits 3 to 4 weeks before harvest accelerated maturity and colouring. Where the spray was applied to individual fruits of Rome Beauty, fruits on adjacent spurs remained unaffected, thus indicating that the hormonal effect was localized. Variation in response where whole branches were sprayed may therefore be explained partly by variability in spray coverage as well as by normal individual differences in stage of development of the fruits. At 10 p.p.m. 2,4,5-T there was no response, but above 50 p.p.m. the response became more marked as the concentration increased. Injury occurred, however, at 100 p.p.m. and over, a proportion, varying with the variety, of the foliage turning yellow. It is suggested that this yellowing may be an expression of leaf maturation rather than, or in addition to, any toxic effects.—Plant Industry Stat., Beltsville, Md.

# 203. MURNEEK, A. E.

## Search for a better preharvest spray.

*Proc. Amer. Soc. hort. Sci., 1950, 55: 177-80, bibl. 4, being Contr. J. Ser., Dep.*

*Hort., Mo. agric. Exp. Stat. 1180.*

Following successful preliminary trials in 1947 with 2,4-D on apples at Columbia, Missouri, further trials were made in 1948 and 1949 using single applications, on 10 to 15 September, of 2,4-D, naphthaleneacetic (NA), 2-methyl 4-chlorophenoxyacetic (Tolox), and p-chlorophenoxyacetic (CIPA) acids. For the variety Winesap, 2,4-D at 10 p.p.m. proved outstanding in preventing fruit drop for a long period without any immediate or delayed harmful effects to the tree, but for Jonathan it showed no advantage over NA. Tolox at 20 p.p.m. was fairly effective on Winesap and may also be of value for Jonathan; trials with higher concentrations are recommended. NA at 10 p.p.m.

was generally least effective; and CIPA at 20 p.p.m. only slightly better.

# 204. UOTA, M.

## Spray for redder apples?

*Canad. Gr., 1950, 73: 9: 7.*

The effect of temperature on anthocyanin formation in McIntosh apples was studied at Ithaca, N.Y., by enclosing one limb of a tree in 4 separate plastic chambers, where the temperature was held at different levels. The tabulated results show that anthocyanin synthesis proceeds most rapidly in the cold, i.e. at average temperatures of 46.5 and 60.5° F. during the night and day respectively. In other, as yet preliminary trials the colouring of McIntosh apples was greatly improved by several applications of a 1% and 0.5% sodium diethyldithiocarbamate spray. This chemical proved more effective and less injurious than soluble thiocyanate salts, which had been used earlier for the purpose.

# 205. SWINGLE, C. F.

## Wax sprays on sour cherries in Wisconsin.

*Proc. Amer. Soc. hort. Sci., 1950, 55: 159-62, bibl. 2.*

In 1948, a year of heavy crop and drought, two pre-harvest sprays with Dowax 222 at 1 in 100 gave inconclusive results with Early Richmond and Montmorency cherries in three orchards out of four in Wisconsin. In the fourth the size and total dry matter yield of Montmorency cherries were markedly increased, but quality as indicated by total solids was reduced. In 1949, with a light crop and abundant soil moisture, Dowax again increased the weight of crop, but without a corresponding increase in total dry matter and with a definite reduction in canning quality. The use of wax is therefore recommended only for orchards carrying a heavy crop and in which soil moisture conditions are below average.

# 206. CLEMENTS, J. R., AND PENTZER, W. T.

## Growth and ripening response of figs to olive oil and other materials.

*Proc. Amer. Soc. hort. Sci., 1950, 55: 172-6, bibl. 7, illus.*

Applying 1 drop of olive oil to the skin at the "eye" of Mission and Lob Ingr (Calimyrna) figs, 1 to 3 weeks before harvesting, produced a marked increase in growth and colour development without detriment to their sugar content and quality, or drying of the skin. These results agree with responses reported in South Carolina in 1831. An unusual growth and colouring response was also obtained with tartaric acid.

# 207. HARTMANN, H. T.

## Tests with growth-regulating chemicals for increasing fruit set and yields in olives.

*Proc. Amer. Soc. hort. Sci., 1950, 55: 181-9, bibl. 9, illus.*

In trials over 4 years in California 16 growth-regulating substances were sprayed onto olive trees at different times and concentrations, but none was effective in increasing yields. Certain of the materials caused serious distortion of young growths and leaves. It is suggested that one cause of non-bearing in olives is the occurrence of an insufficient number of perfect flowers at anthesis, due apparently either to an abortion of the pistil some time between flower bud differentiation in



March and anthesis in May, or simply to failure of the pistil to develop.

208. MARTH, P. C., HAVIS, L., AND PRINCE, V. E.  
Effects of growth-regulating substances on development and ripening of peaches.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 152-8, bibl. 6.

1. The rate of development and ripening of 18 varieties of peaches was found to be hastened by spray applications of 2,4,5-trichlorophenoxyacetic acid to the tree and fruit. 2. Fruits that were induced to ripen approximately 2 weeks to 1 month ahead of normal were usually rough, small in size, and of poor quality. 3. Early-maturing varieties that received too strong a spray or late-maturing varieties that were sprayed too early produced fruit of small size and poor quality. It seems desirable to use concentrations of not over 25 p.p.m. on early varieties (ripening more than 3 weeks before Elberta), while with later-maturing varieties the concentration may be increased to as much as 50 p.p.m. 4. The exact concentration or exact time of application best suited for the varieties included in this work was not determined, nor is it known whether these chemicals were retained in or on the tree in amounts that might result in later damage. [Authors' summary.]—Plant Industry Station, Beltsville, Md.

209. WAIN, R. L.  
Setting fruit by chemical treatment.  
*Fmg, Norwich*, 1950, 4: 245-8, illus.

A brief description is given of trials on the use of growth substances to promote fruit setting in tomatoes [see *H.A.*, 20: 2865 and 2866] and pears at Wye College. In the trials on pears a large number of substances were examined among which only  $\alpha$ -(2-naphthoxy)-propionic acid proved effective. With emasculated flowers of Pitmaston Duchess and Dr. Jules Guyot an initial spraying with 100 p.p.m. caused 100% set in two seasons. Repeating the spraying at 3-day intervals resulted in an economic yield of parthenocarpic fruit, and yields from trusses that had received 2 to 6 sprays were generally satisfactory.

210. DETAR, J. E., GRIGGS, W. H., AND CRANE, J. C.  
The effect of growth-regulating chemicals applied during the bloom period on the subsequent set of Bartlett pears.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 137-9.

Among 10 chemicals tested on Bartlett pears in California in 1949, one of them, 2,4,5-trichlorophenoxypropionic acid, gave a significant increase in fruit set. This increase was progressive as the concentration was increased from 10 to 100 p.p.m., except for the 75 p.p.m. treatment. The weight of individual fruits was not affected by spraying at the pink bud stage, but was reduced significantly by spraying at full bloom and at petal fall. The treatments had no effect on fruit shape, rate of maturity or degree of parthenocarpy, and no spray injury to foliage was observed.

211. SERGEEV, L. I.  
The effect of growth substances on the reproductive organs of fruit trees. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 62: 545-8, bibl. 8, illus. [received 1950].

From experiments with pear trees, on which many flowers were damaged by spring frost, it is concluded that 2,4-D at 5 p.p.m. is the best and cheapest growth substance for use in controlling summer drop of fruit.

### Pruning.

(See also 234h.)

212. MAURER, K. J.  
Grundsatzwandlung in der Frage der Stammhöhe. (Fundamental changes in opinions on stem height.)  
*Deutsch. Garten.*, 1950, 61: 15: 2, 17: 1, 18: 11.

For economic and physiological reasons a general preference for half standards rather than standards is reported from various fruit growing countries. According to Canadian and Russian observations the upright growth of the crown increases with the shortening of the stem, and it is generally accepted that with the shortening of the stem the trees come into bearing earlier. While the Americans want all varieties to be of equal height, the Russians hold that each variety should be considered on its own merits. O.J.

213. GOLDSCHMIDT, V. H., AND DELAP, A. V.  
The spindle bush method of growing apple and pear trees.\*  
*Fruit Year Book*, 1950, pp. 54-66, illus.

The spindle bush method of training, producing a tree somewhat similar to the dwarf pyramid, became very popular in certain fruitgrowing areas of Germany during the war. The method and its applications have been described in detail by W. Fey and A. G. Wirth in their book *Der Spindelbusch, eine Idealbaumform für den Garten der Selbstversorgers und für Erwerbsobstpflanzungen* [for abstract see *H.A.*, 16: 76], of which the present account is an adaptation offered in the hope of encouraging further trials with this form of tree. The text is accompanied by beautifully drawn illustrations, simplified with great advantage from the original photographs.

214. LAMB, J. G. D.  
Cropping of espalier and spur-pruned bush apple trees.  
*Fruit Year Book*, 1950, pp. 67-71.

Annual cropping figures of individual trees of Newton Wonder, Bramley's Seedling, Ribston Pippin and Charles Ross grown as espaliers, and Bismark, Ecklinville, Lane's Prince Albert, Cox's Pomona and Allington Pippin grown as bush trees at Rathmines, Dublin, over a period of 20 years are recorded graphically and briefly discussed.

215. HAVIS, L.  
Pruning peach trees in the United States.  
*Fruit Year Book*, 1950, pp. 72-80, illus.

Pruning of the peach tree in the usual orchard forms should consist in training and renewal pruning. The training is started immediately after the tree is planted, and the purpose is largely to obtain and maintain a tree capable of carrying heavy crops of high-quality fruit. A symmetrical, spreading tree with strong, wide crotches is necessary. Very little pruning is necessary

\* A limited number of reprints may be obtained on application to this Bureau.

or desirable after the second season in the orchard until the tree is well into bearing. Only a gradual opening of the tree centre and occasional heading to an outward-growing lateral should be done. As the tree becomes older, the amount of pruning increases. Renewal points are established at 8-10 ft. from the ground. Large upright branches are then removed, especially in the tree centre. Where there is danger of spring frost, some of the detailed pruning may well be delayed until just after full bloom; but it should not be delayed more than necessary. It is better to prune quite late in the spring, however, rather than not at all for a season. [Author's summary.]

216. CARLONE, R.

Sul taglio dell' apparato radicale al momento del trapianto del pero Passa Crassana innestato sul cotogno. (The effect of root pruning Passe Crassane pears on quince at the time of transplanting.) [English summary 10 lines.]

Reprinted from *Ann. Accad. Agric. Torino*, 1948/49, 91: 27-55, bibl. 46.

The author follows up a review of work on root pruning with an account of observations made at Turin in 1946 and 1947 on Passe Crassane pears grafted on quince. On transplanting, these were root pruned either (1) almost totally, by Stringfellow's method, or (2) so as to leave one-third of the roots only, or (3) to leave two-thirds of the roots. The best results as regards vegetative vigour were achieved by leaving two-thirds of the roots, the worst by leaving one-third of the roots, while no pruning at all resulted in worse growth than the almost total removal of roots.

### Harvesting and packing.

(See also 234t.)

217. WITZEL, S. A., AND MOULTON, F. S.

Build a pole-type packing house.

*Amer. Fruit Gr.*, 1950, 70: 11: 7, 26, illus.

The construction of a cheap, pole-type packing shed is described. It is made of pressure-treated creosoted poles and ties, and is 30 feet wide and 70 feet long, with a roofed loading dock extending another 6 feet, providing 2,500 square feet of usable floor space. A complete set of working drawings is available for \$1.00 from Plans Dept., American Fruit Grower, 1370 Ontario Street, Cleveland 13, Ohio.

218. VAN DOREN, A., AND SKODVIN, K. H.

A study of the hours delay between time of picking and time of arrival at the warehouse of the red strains of Delicious apples.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 233-5, being *Sci. Pap. Wash. St. agric. Exp. Stats* 852.

The time elapsing between picking and arrival at a central warehouse, and typical core temperatures are recorded for Red Delicious apples from 16 orchards in the Wenatchee area. When placed in cold storage at 30-5° F., apples in the centre of bushel cardboard cartons with nesting trays cooled more rapidly than those in the centre of standard wooden boxes.

219. COURSHÉE, R. J., AND HOARE, E. R.

Fruit sizing and grading machinery.

*Rep. Nat. Inst. agric. Engng.*, C.S. 4/1161, 1950, pp. 49, illus.

Eight fruit graders have been examined, the Notenboom tomato grader, the Helix tomato grader, the Tod tomato grader, the Oxlo grader, the Drake and Fletcher fruit grader, the Bean Cutler grader, the Bartlett grader and the Lightning grader. Measurements were made on throughput, accuracy of sizing and the damage caused by the machine in each case. The graders examined show that the range of types is sufficiently wide to cover all purposes except one: there was no mechanical grader suitable for a grower with less than 5 acres of fruit. No one grader, however, suits all requirements, so the grower must make his choice carefully and realize the limitations and drawbacks of that choice. Full comparisons were not made between the various graders, but it is concluded that there are several satisfactory machines on the market; all of these could do with minor modifications, but it is thought that their evolution can safely be left to the initiative of the manufacturers in co-operation with the packers. Apart from routine examinations of new graders, it is not proposed to carry out any further investigations on fruit sizing and grading machinery at present.

220. ANON.

Brambles without bruises.

*Fruitgrower*, 1950, No. 2,863, p. 509, illus.

A new apple grader, the "Iden", has a capacity of 1,000 bushels a day with 8 operators. It is constructed of wood and aluminium and is operated by a  $\frac{1}{4}$  h.p. electric motor. The fruit is graded for both size and weight.

221. STEWART, N.

For apples and pears—grading and packing.

*Fruitgrower*, 1950, No. 2,858, pp. 437-8.

Grading, sizing and wrapping techniques are described and packing practices are discussed.

222. WASHINGTON STATE APPLE COMMISSION.

Causes of bruises in packing apples—1949 report.

[Mimeo. Publ.] *Wash. St. Apple Commission*, 1949, pp. 12.

A study was made of the causes of bruises on apples in 4 packing houses in the Wenatchee and Yakima areas of Washington State. The human element was found to be at fault in using too much force in placing the fruit into the boxes, in delivering weak fruit to the packing house and in lack of supervision in some packing houses. Faulty practices included packing the top tier too far above the box, placing the calyx end of Delicious apples next to the end of the box, misplacement of apples, and failure to observe the rule of placing large fruit in the middle of the box.

223. HUBBARD, E. S.

Changing styles in apple packs.

*Wis. Hort.*, 1950, 41: 1: 6.

Packing McIntosh apples in layers between quarter-inch cardboard instead of in the old jumble pack has increased consumer demand in eastern America.



*Storage.*

(See also 135, 234d, m, o, 1206, 1216, 1235.)

224. WAGENINGEN.

Instituut voor Bewaring en Verwerking van Tuinbouwproducten, Wageningen. ([An account of the] Institute for the Storage and Processing of horticultural Produce.) [Publ.] I.B.V.T. Wageningen, 1950, pp. 30, illus.

This brochure summarizes the work of the Institute, which consists of research and advisory work on the storage and processing of fruit, vegetables and flowers, gives an account of the new laboratories in the process of construction, and gives a list of papers published by the Institute since 1931.

225. ULRICH, R.

La respiration des fruits. Intérêt biologique et pratique. (Biological and practical aspects of fruit respiration.)

*Fruits d'Outre Mer*, 1950, 5: 119-23, bibl. 9.

Experimental data on the respiration of apples, pears and bananas are reviewed under the following heads: (1) Respiratory gas exchange under ordinary conditions; (2) the influence of different factors on fruit respiration; (3) the interior atmosphere and its relation to the surrounding air; (4) the interpretation of experimental results; and (5) practical application.

226. FIDLER, J. C.

The effects of ethylene on fruits and vegetables.

*Agriculture, Lond.*, 1950, 57: 285-8.

Work in America and Britain on the properties of ethylene and its uses in the ripening of fruits is reviewed briefly. [The inclusion of a bibliography would have made this interesting article more valuable.—ED.]

227. ACERETE, A.

Conservación de manzanas. (Apple storage.)

*Bol. Estac. exp. Aula Dei* 5, 1949, pp. 93, bibl. 74, illus.

It is only during the last 10 years in Spain that refrigerated stores have been used to any great extent for the storage of apples. There are not yet sufficient of such stores in existence and growers are not generally sufficiently familiar with their management to obtain the best results. In this bulletin the author summarizes information drawn mainly from British and American sources, much of it not previously published in Spanish, on the construction and management of cold and gas stores, factors affecting the keeping quality of apples, accessory treatments such as wrapping and the use of skin coatings, storage disorders and pests, and the special storage requirements of a number of English varieties. The individual requirements of most of the common Spanish varieties have not yet been determined. The illustrations of storage disorders leave much to be desired, but in other respects this explicit and up-to-date bulletin, with its useful bibliography, should go far to meet the needs of the Spanish grower.

228. ALLEN, F. W., AND TORPEN, E.

Gravenstein apple storage tests.

*Bull. Calif. agric. Exp. Stat.* 716, 1950, pp. 23.

During tests conducted at the University of California, Gravenstein apples were stored at 32° F. for periods ranging up to 120 days. Cold storage helped to lengthen their saleable life, but there were certain limiting factors involved, including: bitter pit, which may develop after a few weeks of storage; scald; deterioration in flavour, which developed after 2½ to 3 months; and over-ripeness and breakdown after 100 to 120 days. These troubles were not generally associated with fruit from particular orchards. The most desirable fruits for storage were apples harvested at midseason, and of medium or small size and high colour, i.e. red stripes. Preliminary trials with a few apples stored in artificial atmospheres [gas storage] at 32° F. and 42° F. indicate that colouring, softening and decay may be retarded, but the flavour of the fruit is not as good as that of apples stored in normal air.

229. KIDD, F., AND WEST, C.

The refrigerated gas storage of apples.

*Food Invest. Leaflet. D.S.I.R.* 6 (revised), 1950, pp. 16, bibl. 26.

A revised edition of the leaflet published in 1935 (see *H.A.*, 5: 497). The information has been brought up to date, and notes have been added on the method of testing a store for gas-tightness, and on the design, construction and operation of a scrubber. The approximate values for CO<sub>2</sub> production and heat production of Bramley's Seedling in air at various temperatures are shown in a graph, and the values for the relative rate of CO<sub>2</sub> production of 14 other varieties are tabulated. The bibliography has been considerably extended.

230. FIDLER, J. C.

The refrigerated gas storage of apples and pears.

*Food Invest. adv. Note D.S.I.R.* 1, 1950, pp. 2.

This note outlines the main points in *Food Investigation Leaflets* Nos. 6 and 12 [see *H.A.*, 19: 3494 and abstract 229 above].

231. CASTBERG, C.

SPF:s Lagringstävling 1949-1950. (Apple storage competition of the Swedish Pomological Society 1949-50.)

*Fruktodlaren*, 1950, No. 5, pp. 176-80.

The data presented include weight losses during storage of 6 apple varieties and an assessment of shrivelling at the end of the storage period. Cox's Orange showed a pronounced tendency to shrivel as compared, for instance, with Ribston, though the difference in loss of weight between the two varieties was small. *Gloeosporium* rot was again prevalent, Cox's Orange being particularly susceptible in contrast to Ribston.

232. VAN DOREN, A., AND BULLOCK, R. M.

Air purification studies in Pacific Northwest refrigerated storage rooms.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 239-46, bibl. 7, being *Sci. Pap. Wash. St. agric. Exp. Stats* 868.

In several commercial scale tests with 6 apple varieties air purification with high grade activated shell carbon used in "Dorex" air purification equipment added 1 to 2 months to the storage life of the fruit and

significantly reduced the incidence of scald in cases where this trouble occurred. No off-flavours or storage odours developed. Bartlett and Anjou pears in a single trial showed a similar improvement in storage life. Two other systems of air purification, using "Pur Air" and home-made equipment, were ineffective.

233. MATTUS, G. E.

**Rate of respiration and volatile production of Bartlett pears following removal from air and controlled atmosphere storage.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 199-211, bibl. 7, illus.

In storage tests during 1948/49 at Cornell University, Bartlett pears were stored at 33° F. in air and in controlled gas storage of 9.0% or 5.0% CO<sub>2</sub> to 3.5% O<sub>2</sub>. Storage life in air was 84 days compared with over 206 days in gas storage. Pears removed from air storage after 1 month lasted 7 days, whereas pears that had been gas-stored for 7 months lasted 9 days. Two days after removal to 74° F. air-stored pears showed higher production rates of CO<sub>2</sub>, ethylene and oxidizable volatile substances other than ethylene than did gas-stored pears. The normal storage life of the fruit terminated before the respiratory climacteric was reached but after ethylene production had reached its peak, regardless of the method of storage. Gas-stored pears produced only a small quantity of oxidizable organic volatile substances other than ethylene while still in storage, whereas the quantity produced by air-stored pears was many times greater. Only in the production of these organic volatile substances other than ethylene was there a considerable difference in the level of production of the air- and gas-stored pears.

*Noted.*

234.

a CARLONE, R.

**La pera Madernassa. (The pear variety Madernassa.)**

*Ital. agric.*, 1950, **87**: 419-29, illus.

b CRANE, H. H., AND TOMALIN, T. E.

**The selection of fruits for exhibition and the technique of showing.**

*Fruit Year Book*, 1950, pp. 117-21.

c CRANG, A., AND STURDY, M.

**The retention of ascorbic acid in preserved fruits. II.**

*J. Sci. Food Agric.*, 1950, **1**: 252-4, bibl. 4. For part I, see *Chem. Industr.*, 1948, pp. 583-5.

d D.S.I.R., LONDON.

**Recommended conditions for storing English apples and pears.**

*Food Invest. adv. Note D.S.I.R.* **2**, 1950, pp. 2.

e EVREINOFF, V. A.

**L'origine du cognassier et de ses variétés. (The origin of the quince and of its varieties.)**  
*Rev. hort. Paris*, 1950, **122**: 11-14, bibl. 18, illus.

f LOEWEL, —.

**Bodenbearbeitung in Busch- und Spindelbusch-Anlagen mit Schlepper und Scheibenege. (Soil cultivation in bush tree and spindle bush orchards by tractor and disc harrow.)**

*Mitt. ObstbVersuchsring Jork*, 1950, No. 17/18, pp. 101-2, illus.

Various implements are described and illustrated.

g MAKHDUM, N. A., AND RIAZ-UR-RAHMAN.

**Utilization of crab apple for preserve.**

*Punjab Fruit J.*, 1950, **14**: 6-7.

h MARINUCCI, M.

**Recenti vedute sulla potatura e sulla concimazione dell' olivo. (Views on olive pruning and manuring.)**

Reprinted from *Convegno Studi olivic.*, May 1942, pp. 34 [received 1950].

i MARINUCCI, M.

**Ricostituzione dell' oliveto. (Restoration of old olive trees.)**

*Manuale prat. Agric.\** **139**, 1945, pp. 82, illus., lire 55 [received 1950].

j MINISTRY OF AGRICULTURE, LONDON.

**Apples and pears.†**

*Bull. Minist. Agric. Lond.* **133**, 2nd ed., 1949, pp. 124, bibl. 37, illus., 3s. 6d.

In this new edition, the text has been only very slightly revised.

k MINISTRY OF AGRICULTURE, LONDON.

**Managing and manuring orchard soils.**

*Adv. Leaflet. N.A.A.S. Lond.* **329**, 1950, pp. 6.

l MINISTRY OF AGRICULTURE, LONDON.

**The British national hive.**

*Adv. Leaflet. N.A.A.S. Lond.* **367**, 1950, pp. 8, illus.

m PATRON, A.

**Recherches sur le brunissement non enzymatique des fruits et des produits de fruits en conserve. (The non-enzymatic browning of fruits and fruit products.)**

*Fruits d'Outre Mer*, 1950, **5**: 167-72, 201-7, bibl. 20.

n PETROV, E. M.

**Greater attention to *Sorbus*. [Russian.]**

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 56-9.

o ROBERTSON, R. N.

**Fruit storage and plant physiological research.**

*Food Pres. Quart.*, 1950, **10**: 25-9, bibl. 9.

p ŠČASTLIVÝ, A. K.

**Black fruited *Sorbus*. [Russian.]**

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 59-61.

\* Publishers, Ramo Editoriale degli Agricoltori, Via Quattro Fontane, Rome.

† For abstract of the first edition, see *H.A.*, 16: 1783.



- q SMITH, E. L.  
Apple pomace silage.  
*Agriculture, Lond.*, 1950, **57**: 328-32, bibl. 11.

- r TOMALIN, T. E.  
Pears: late-keeping varieties.  
*Fruit Year Book*, 1950, pp. 122-9.  
A report of a discussion by the R.H.S. Fruit Group in March, 1950.

- s WELLINGTON, R., AND LAMB, R. C.  
Sweet cherry breeding.  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 263-4, being *J. Pap. N.Y. St. agric. Exp. Stat.* 807.

- t WESTERN REGIONAL PEACH MARKETING PROJECT.  
Consumer demand for peaches of varying stages of maturity.  
*Bull. Utah agric. Exp. Stat.* **339**, 1950, pp. 20.

## SMALL FRUITS, VINES AND NUTS.

### *Small fruits.*

(See also 111, 113, 114, 124, 234b, 300b, f, 301, 443, 489-491, 1214, 1216, 1222, 1228, 1231, 1233, 1235.)

235. HALL, J. W.  
Scottish fruit inspection and certification schemes.  
*Gr. Digest*, 1950, **2**: 1: 11-18.

This paper describes the schemes for raspberries, strawberries and black currants, and stresses their importance to all soft-fruit growers.

236. NEDERLANDSE ALGEMENE KEURINGS-DIENST VOOR BOOMKWEKERIJGEWASSEN.  
Keuringsvoorschriften voor the framboos 1950. (Inspection instructions for raspberries 1950.)  
N.A.K.B. (The Hague), 1st impression, 1950, pp. 9.

The general methods of inspection and certification of nursery material, on which these instructions for raspberry are based, were reviewed in *H.A.*, 20: 556.

237. DICKEY, R. D.  
Blackberry culture in Florida.  
*Press Bull. Fla agric. Exp. Stats* **657**, 1948, pp. 4 [received 1950].

Most of the varieties of blackberry (including dewberry hybrids) grown in the northern or western States of America have not proved sufficiently productive when planted in Florida, and there is no commercial blackberry industry in that State. Of the varieties tested, Advance, Young, Florida Marvel and McDonald, in the order named, have given the best results. Very brief cultural directions and notes on the most suitable varieties are given.

238. TER PELKWIJK, A. J.  
Het determineren van bramen. (The identification of blackberries.)  
*Tijdschr. PlZiekt.*, 1950, **56**: 262-4, illus.

Brief notes are given on the collection of blackberry shoots for identification.

239. HEIT, C. E., AND SLATE, G. L.  
Treatment of blackberry seed to secure first year germination.  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 297-301, bibl. 8, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* 806.

From experiments at Geneva, New York, it is concluded that treatment in August of blackberry seed with concentrated sulphuric acid for 45 to 60 minutes

at room temperature, followed by sowing in peat moss and keeping in cool frames until March, will give a good stand of seedlings in the first year. Shorter periods in acid were less effective, and longer periods caused serious injury to the seed. Treatments with vinegar, graino, vitamin B<sub>1</sub> and potassium nitrate were ineffective.

240. BAILEY, F. L.  
The culture of Chinese gooseberry vines.  
*N.Z. J. Agric.*, 1950, **80**: 223-31, bibl. 1, illus.

In recent years the cultivation of the Chinese gooseberry (*Actinidia sinensis*) has developed in districts of New Zealand where citrus fruits and tree tomatoes thrive. Advice for prospective growers is here given on selection of site, essential shelter, strains, pollination, raising seedling stocks, budding and grafting, reworking and other cultural processes, including manuring, pests and diseases, harvesting and packing.

241. EVREINOFF, V. A.  
Notes sur les variétés d'*Actinidia*. (Notes on varieties of *Actinidia*.)  
*Rev. hort. Paris*, 1949, **121**: 155-8, bibl. 19, illus.

Plants of the genus *Actinidia*, grown mainly in the Far East, are dioecious, deciduous climbing shrubs, very resistant to cold and requiring a good deal of moisture in the soil and atmosphere. The fruit is exceptionally rich in vitamin C, its antiscorbutic value being 10 times as great as that of the lemon. The species of most interest to the fruit grower are *A. arguta*, *A. kolomikita* and *A. chinensis*. Notes, dealing with synonyms, origin, description of fruit and vine, and cultural requirements, are given on 6 of the varieties raised by the Russian plant breeder Mičurin and on other varieties commonly grown in the Far East and America.

242. BAILEY, F. L.  
Frames for Chinese gooseberry vines.  
*N.Z. J. Agric.*, 1950, **80**: 347-51, illus.

Descriptions and illustrations are given of pergola and double-fence types of framework used in the Tauranga district for training Chinese gooseberry plants. All are built solidly and have proved very satisfactory.

243. SIMONOV, I. N.  
Using mixed pollen in raising black currants. [Russian.]  
*Agrobiologija* (Agrobiology), 1949, No. 5, pp. 133-4.

Increased set of fruit in black currants was obtained by using mixed pollen from 2 or 3 other varieties, the best results being obtained with a mixture from 3 varieties.

244. LOGINYČEVA, A. G.

**Selection of pollinators for soft fruit plantations.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 29-30.

Results of experiments carried out in North-Eastern Russia with gooseberries, currants and raspberries showed that all three fruits produced higher yields when pollinated with another variety. A considerable variation was noted in this increased fruit formation depending on the pollinator. Varieties observed included the black currants Kent, Coronation, Laxton, Boskoop Giant; the gooseberries Carrie, Houghton, English Yellow; and the raspberry Marlborough.

245. BOSAK, D. E.

**Gooseberry and currant propagation.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 31-4, illus.

The very effective method of layering, worked out by the author, is carried out on special propagation plantations from approved high quality bushes of standard varieties. During the second year after planting, further selection takes place and the bushes are generally prepared for propagation. Layering is done in the third year, from 5-year-old bushes. 1-, 2-, 3-, 4- and 5-year-old branches are used; from one plant about 25-30 branches are evenly distributed and layered around the bush, leaving 5-6 branches for normal growth. The performance is repeated the next year. After 2 years of intensive propagation the plants have a 3-4 year recuperation period, during which fertilizing, pruning and other normal cultural practices are carried out. When approximately 11 years old, another 2 years of propagation follows. Transplanting of the rooted layers into prepared nurseries takes place at the beginning of November.

246. WENZL, H.

Eine neue rotfrüchtige mehlauresistente Stachelbeersorte. (A new red-fruited, mildew-resistant, gooseberry variety.) [English summary 5 lines.]

*PflSch. Ber. Wien*, 1950, 4: 106-9, bibl. 5, illus.

In the small-fruit growing area to the north-west of Vienna a red-fruited gooseberry variety has been discovered which is highly resistant to mildew, *Sphaerotheca mors-uvae*. The "Mehltaufeste Höfleiner" is vigorous and bears prolifically; fruit quality is reported to be good, though the skin is somewhat tough. Further tests of this variety, which presumably originated from a local seedling, appear to be warranted.

247. WHITE, D. G., AND KENNARD, W. C.

**A preliminary report on the use of maleic hydrazide to delay blossoming of fruits.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 147-51, bibl. 10, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1543.

1. Dilutions of 1,000, 1,500, 2,000, and 3,000 p.p.m. of maleic hydrazide were sprayed on apple, grape, strawberry, and black raspberry plants in late spring

to delay blossoming. 2. Blossoming of apple (in early pink stage at time of treatment) was not delayed. 3. Blossoming of grape was not delayed but secondary buds were activated. 4. Blossoming of strawberry was stopped temporarily and resumed, indicating that earlier treatment might be successful. 5. Blossoming of black raspberry was delayed 24 to 38 days in comparison with that of check plants. Maturity of fruit was delayed 16 to 23 days. No injury was apparent in this season on plants treated with the lower concentrations. [Authors' summary.]

248. SNYDER, J. C.

**Strawberry growing in Washington.**

*Ext. Bull. Wash. St. agric. Ext. Serv.* 246 (revised), 1950, pp. 50, illus.

This bulletin, originally issued in 1938, has been revised, and now presents up-to-date information on strawberry growing in one of the most important producing States in the U.S. The various operations from selection of site to harvesting are discussed in detail, with the aid of illustrations. Great stress is laid on green manuring in preparation of land for planting and in crop rotation. Weed control with chemicals is considered, and using geese as weeder in strawberry fields where chickweed, sand rush and grasses are present is suggested. Irrigation is a regular practice in the dry regions of Washington, in other parts it supplements natural rainfall. Mulching, though by no means a general practice, is considered. A list of varieties is given with brief notes on their characteristics. A section is devoted to everbearing strawberries, five varieties being recommended. A number of pests and diseases and their control are described, and finally figures are given of production and returns.

249. CHILDS, W. H.

**Strawberries for West Virginia Farms.**

*Circ. W. Va agric. Exp. Stat.* 64 (revised), 1950, pp. 22, illus.

Supplies of locally produced strawberries in most parts of West Virginia are well below market demand. After a brief consideration of suitable locations and soils for successful commercial production, all aspects of growing the crop are described.

250. NYHLÉN, Å.

Försök med jordgubbar vid Nyckelby under åren 1944-1948. (Strawberry trials at Nyckelby, Sweden, 1944-48.) [English summary 1 p.]

*Medd. Trädgårdsförs. Malmö* 57, 1950, pp. 18, bibl. 7.

In trials comparing 10 strawberry varieties, highest yields were obtained from the new Alnarp strain Southland × Luna 235 and from Southland. Deutsch Evern was at least two days earlier than Southland, and the Alnarp seedling XVI-52, also a good cropper, was the latest variety. Irrigation practised from 15 May to the end of August, so as to bring the total precipitation up to 100 mm. per month, was found to increase yields only during the first year and to have no influence on fruit size or earliness. In a small-scale manurial trial the application of feather offal resulted in higher yields than that of artificial fertilizers, but the difference was not significant.



251. GILBERT, F. A., AND ROBBINS, W. R.  
**Calcium-boron nutrition of the strawberry.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**:  
 276.

An abstract is given of a paper to be published in full in *Plant Physiology*. The results of an experiment in New Jersey with the strawberry variety Sparkle, grown in sand culture, indicate that the range of nutrient concentration of B for satisfactory growth and fruit quality lies between 0.05 and 0.25 p.p.m. and that of Ca from 100 to 250 p.p.m.

252. EDDIE, A. H.  
**Effect of removal of runners from strawberry plants.**  
*N.Z. J. Agric.*, 1950, **81**: 126, illus.

This is a brief article showing the vigour imparted to strawberry plants by de-runnering them.

253. JUDKINS, W. P.  
**The effect of training systems and irrigation on the yield of everbearing strawberries grown with sawdust mulch.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**:  
 277-84, bibl. 1.

Spacing and irrigation trials on everbearing strawberries in Ohio in 1948 and 1949 are described. In June, 2 months after planting, a 1-in. layer of sawdust was spread over the whole area. Setting parent plants 1 ft. apart in triple rows to give 33,000 plants per acre gave 40% to 60% higher yields in the first year than planting in a single row (11,000 parent plants) and allowing one runner plant to develop on either side; in the second season differences in cropping were insignificant. The matted row system involving 8,250 parent plants and an indefinite number of runners was a failure. Removing blossoms of the June crop in the second season actually caused a slight reduction in the autumn crop compared with plants from which both crops were taken. In 1949, irrigation increased the summer and autumn yield in the 33,000 parent plant plots set out earlier that year by over 60%, but reduced yields by 24% to 40% in the 11,000 plus 22,000 runner plots, possibly as a result of greater vegetative growth in the latter. In comparing 8 varieties, Brilliant, Superfection, Gem and Streamliner gave better yields and larger autumn fruit than Wayzata, Mastodon, Brune's Marvel and Gemzata.

#### Vines.

(See also 15, 123, 181, 191, 300c, 300e, 300g, 300i, 1194, 1222, 1226, 1231, 1232, 1233.)

254. DALMASSO, G. [Editor].  
**Convegno Internazionale di Studi Viti-Vinicoli. (Proceedings of an International Congress on vines and wine-making.)**  
 "Agef", Turin, 1949, pp. 249.

A grant from the University of Turin made for the institution of a post-graduate course in viticulture and wine-making in honour of the late Count Cinzano was expended in 1949 in the holding of a conference in which prominent Italian, French and Swiss experts took part. The proceedings, mainly in Italian, concern the following among other subjects: The importance of selection in viticulture; floral biology as a factor in vine fertility; vine mildew, its prevention and control

[numerous papers]; yeasts and other oenological problems.

255. CARRANTE, A., AND DALMASSO, G.  
**Rapport général sur les raisins de table dans le monde. (General report on table grapes throughout the world.)**  
*[Publ.] Off. int. Vin*, [1947], pp. 12  
 [received 1950].

A paper presented to the 3rd International Congress on Grapes, Grapejuice and Wine, held at Istanbul in 1947. It is noted that the war and the ravages of phylloxera have seriously affected the production of table grapes whereas the demand for high quality fruit is good. As there is now no danger of a saturated market, growers need no longer plant dual-purpose varieties except for home consumption. One of the main problems of the industry is the selection of the best varieties from among the innumerable types available. It is suggested that the number of commercially grown varieties should be drastically reduced, and a selection is given of the more important varieties grown in the various grape-producing countries. The need for eliminating confusion in nomenclature is stressed. Other problems, such as choice of districts for planting, rootstocks and pruning systems, are touched on, and three simple methods of storing table grapes are noted.

256. DALMASSO, G.  
**Il problema economico della ricostruzione viticola in Italia. (The economics of viticultural reconstruction in Italy.)**  
 Reprinted from *Att. Congr. agrar. naz.*  
 Turin 1948, 1950, pp. 20.

The subject is dealt with entirely from the economic standpoint. Although the progress of phylloxera in Italy has been much slower than elsewhere, it is inexorable and overwhelming. The author demands the co-operation of scientist and economist in devising definite plans for the whole country and a revival of the viticultural associations to ensure that uniform and economic measures are taken. He foresees that in some districts the growing of other crops must be recognized as preferable to the replanting of vines on phylloxera resistant rootstocks, but that in others especially favourable for the production of first-class wine grapes, even though the actual expenses—especially those involved in the mechanical preparation of the land—are very great, they must be faced and overcome by the combined efforts of government and individual vinegrower.

257. HAY, R.  
**Outdoor vine growing in England.**  
*Agriculture, Lond.*, 1950, **57**: 283-5.

A note on efforts to revive interest in vine growing in England, notably by Messrs. R. Barrington Brock and E. Hyams. The latter's book *The Grapevine in England* is discussed here. [For review, see *H.A.*, 20: 462.]

258. MEHREN, G. L., AND SHEAR, S. W.  
**Trends and outlook in the California grape industries.**  
*Circ. Calif. agric. Exp. Stat.* **397**, 1950,  
 pp. 24.

A survey of economic trends in vine growing during the past 30 years, including a section devoted to the wine industry.

## 259. POTAPENKO, JA. I.

Mičurin's agrobiology—in viticulture. [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 8, pp. 9-13, bibl. 3.

An account is given of measures necessary for the successful development of viticulture in Russia, for increased resistance of vine plantations to drought, frost and other unfavourable factors, for increasing yields of vineyards and for the extension of grapevine cultivation into new areas. The use of windbreaks is recommended; the selection of sites and organization of vineyards, and the improvement of the water economy of the soil are dealt with in detail.

## 260. NEGRULJ, A. M.

Vineyards in the Turkmen deserts. [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 10, pp. 14-18, illus.

Almost 75% of the Turkmen S.S.R. is occupied by deserts and only about 1% of the total area is under agriculture. The waters of the chief Turkmen canal, however, could be used to make a large part of the republic fertile and a plea is made for exploiting viticulture in that region. Varieties suitable for growing there are mentioned, and eight of them are illustrated.

## 261. DALMASSO, G.

Uve da tavola per l'esportazione, uve da cura e uve mangereccie. (Dessert grapes, grapes for medicinal purposes, grapes as a staple article of diet.)

Reprinted from *Relaz. Congr. naz. vitic. Uve da Tavola Piacenza*, 1948, pp. 5.

In Italy, where the vine reigns supreme, there is room for discrimination between table grapes. The author distinguishes between the luxury grape of a superb bouquet and appearance for export or the very high class national market, the grape, possibly somewhat insipid, which is suitable for use in the grape cure establishments where very large quantities of grapes are taken "for the stomach's sake", and the ordinary "common or garden" grape which is the staple article of diet of Italians in many parts of the country. [One can only envy a country where soil and climate allow such distinctions to be made.]

## 262. DALMASSO, G.

Cépages à raisin de cuve. (Varieties of wine grapes [in Italy].)

[Publ.] *Off. int. Vin*, [1947], pp. 13 [received 1950].

The preservation of the vast, unselected range of grape varieties grown in Italy clearly reduces the potential quality and quantity of the wine produced. The author suggests that advantage should be taken of the need to replant phylloxera-infested vineyards to bring order out of chaos and to limit the number of commercial varieties grown. Although rigorous selection is desirable, the climate and topography of Italy is so varied that there are dangers in too rigid a standardization. The most important varieties of wine grapes (almost 200) grown to-day in Italy are reviewed.

## 263. RADOVANOVIČ, V.

A study of the varieties in the vine-growing region of Kraina (Serbia). [Jugoslavian, Russian and French summaries  $\frac{1}{2}$  p. each.] *Yearb. Fac. Agric. Belgrade*, 1949, 2: 347-60, bibl. 5.

In connexion with the reorganization of viticulture in Kraina, experiments have been carried out on rootstocks for the varieties grown there. It has been found that the rootstock Riparia  $\times$  Rupestris No. 3,309 did not yield results equal to those obtained in other countries; many vineyards perished within a few years. Trials were carried out with other varieties, e.g. Rupestris du Lot and Berlandieri-Riparia Teleki 8 B, as rootstocks for European varieties. Results obtained in 1946 to 1948 showed that from the former the bunches of grapes were of a better quality than from the latter. Varieties suitable for making white wines and red wines, and varieties for table grapes are mentioned.

## 264. DALMASSO, G.

Nuovi vitigni russi. (New Russian varieties of vine.)

*Ital. agric.*, 1950, 87: 543-4.

Short descriptions of 9 varieties of grapevine raised by the Russian horticulturist Mičurin.

## 265. MAKOVECKIJ, N. I.

Improving the vine variety Pino černyj. [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 9, pp. 40-3.

Trials with "clonal selections" of Pino černyj, a champagne variety of grape, are described. One selection, characterized by its earliness in ripening, is recommended for growing in the more northerly regions where the variety is cultivated.

## 266. SOUSA, L. O. M. DA COSTA E.

Algumas observações para a caracterização botânica dos híbridos Richter (V. Berlandieri  $\times$  rupestris). (Observations on the botanical characters of the Richter vine hybrids, V. berlandieri  $\times$  rupestris.)

*An. Inst. sup. Agron. Lisbon*, 1948-49, 16: 73-90, bibl. 11, illus.

As a result of the frequent production of bud sports, the vine rootstocks used at present consist of very heterogeneous material. Prior to carrying out rootstock trials with the hybrids 8R, 31R, 57R, 60R, 99R and 110R, the author gives detailed botanical descriptions of his material at the Instituto Superior de Agronomia, Lisbon.

## 267. MARRIOTT, P. F.

Pollination of table grapes. Some aspects studied.

*J. Dep. Agric. Vict.*, 1950, 48: 391-4, bibl. 1, illus.

In Victoria the variety Ohanez is a useful late-maturing grape with good storage qualities, but in many seasons fails to set a profitable crop. The variety Waltham Cross is the main grape for the fresh fruit market, but in certain seasons suffers from the disorder called "hen and chickens", which reduces its market value. Investigations were carried out in the 1948-49 and 1949-50 seasons to ascertain whether these troubles



were due to lack of pollination. It was found that the variety Ohanez is self-sterile but the pollen of Gordo Blanco, Sultana, Waltham Cross and Purple Cornichon is compatible with it and will produce a satisfactory set of berries. The variety Waltham Cross is self-fruitful.

268. BUZIN, N. P.

**Pre-planting preparation of vine cuttings.**

[Russian.]

*Agrobiologija* (Agrobiology), 1949, No. 3, pp. 187-91, illus.

In trials described here the best rooting of vine cuttings was obtained with a modification of the ordinary "kiljčevanic" method. In the latter, cuttings are stored, tied in bundles which are inverted in a trench. In the modified method the operation is carried out in a warm frame and the apical ends of the cuttings kept cool by placing a layer of ice or snow below them.

269. MAKAREVSKAJA, E. A.

**The change in the bios content in the rooting of vine cuttings.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 557-60, bibl. 7 [received 1950].

Cuttings of Muscat of Alexandria vine, taken the end of winter and stored at a temperature higher than 0° C., had a greater tendency for shoot development than for root production. On the other hand similar cuttings kept at a temperature lower than 0° C. showed a greater tendency for callus and root development than for shoot growth. Heteroauxin also had an effect on stimulating root development with a corresponding lowering of ability to form shoots. In connexion with the stimulation to root and callus development a general diminution of bios was observed.

270. NAUMENKO, N. P., AND KUTALEVA, T. S.

**Hastening the raising of new vine varieties.** [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 10, pp. 36-9, illus.

The development of seedling vines is hastened by using a method of grafting the seedlings in the cotyledonary phase on to young green shoots of vigorous older plants, the union being tied round with darning wool. The operation is performed in a cool greenhouse, and to prevent the scion from wilting in the early stages it is covered with an improvised belljar supported on a stand to provide a moist chamber for the graft.

271. RUBIN, S. M.

**To increase planting material for vineyards.**

[Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 70-5, illus.

Rapid methods of propagation are described which are suitable for the large-scale production of vine plants. Grafting of scions of 1 bud length on 1-year-old phylloxera resistant rootstocks and "kiljčevanie", the method of planting to induce rooting in vine cuttings [see H.A., 20: 636, 1401], are among the methods described.

272. MANUEL, H. L.

**Vine grafting: details of the wedge system.**

*Agric. Gaz. N.S.W.*, 1950, 61: 243-4, illus.

Wedge grafting is done in the spring as soon as there is sap movement. Soil is cleared from around the stock which is then cut off at ground level. The short scion wedge is inserted and kept in position with a piece of bag thread tied round the stock. Finally the vine is covered with a mound of fine, loose soil and a stake driven in to which the growing scion can be tied. Precautions to be taken in the grafting of old vines and in keeping scion wood are outlined.

273. BOUBALS, D., AND HUGLIN, P.

**Étude de l'incompatibilité au greffage de certains cépages et du 57 R. (A study of incompatibility in grafting certain varieties of vine on 57 R.)**

*Prog. agric. vitic.*, 1950, 134: 183-9.

The author reviews reports of incompatibility and of compatibility of varieties of vine grafted on Rupestris-Berlandieri 57-R, and describes experiments for studying the incompatibility of the variety Jaoumet when so grafted. It was found that in the scion there was enhanced development of phloem and an accumulation of starch, while the rootstock was depleted of starch, a result suggesting that substances elaborated in the scion were unable to pass the union. Further experiments showed that 57 R on Jaoumet developed normally, and that Jaoumet on Aramon or Rupestris du Lot as intermediate on 57 R was at first apparently normal but later turned yellow as a result of the suppression of root development on the 57 R rootstock.

274. PUPPO, A.

**Saggi di biometeorologia e biomatematica vegetale. Il clima e la vite a Conegliano. (Experiments on plant biometeorology and biomathematics. The climate and the vine at Conegliano.)**

Reprinted from *Boll. Soc. venez. Stor. nat.*, 1941, Vol. 2, pp. 141, bibl. 89 [received 1950].

A noteworthy contribution to the determination of probable dates of development in the vine on the basis of the total temperature and radiation experienced.

275. VITES, L. S.

**Autumn planting of young vines in the "covered" zones.** [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 9, pp. 39-40.

From trials carried out in southern Russia where the vines are covered in winter [see abstracts 276 and 277 below] it is concluded that autumn transplanting of young vines is preferable to spring planting. It is recommended that autumn or winter planting should be tried also in the "uncovered" regions, but then the plants should be covered in winter to prevent the buds from being killed by frost.

276. MAKAROV, S. N.

**The importance of an organic layer in covering vines in winter.** [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 9, pp. 46-8.

Organic materials used in covering vines in winter may be straw, dry grass, dry leaves, cut up twigs of trees

(particularly pines and firs), leaves of garden plants, dung, turf, etc. As this layer is often light and porous it is usually covered with soil (2-layered covering), and sometimes has a layer of soil on each side (3-layered). For the most northerly regions of viticulture the 3-layered covering is advised; in the central zone an organic covering is necessary on sandy and gravelly soils, while in the southern zone an organic covering is not always necessary.

277. KALJUŽNYĖ, A. F.

**On covering vines in winter.** [Russian.]  
*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 10, p. 34.

A short article on the damage caused to vines in Uzbekistan when they are left uncovered in winter. Varieties which have suffered severely in recent years at Samarkand, and those which have shown some resistance to winter injury are mentioned.

278. GILJDIEV, S. A.

**Viticulture on saline soils of Uzbekistan.** [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 8, pp. 13-15, bibl. 3.

Viticulture on the saline top soils of the Uzbekistan is described. Salinity is mainly due to  $MgSO_4$ ,  $Na_2SO_4$  and NaCl which appear in varying proportions, either in the top soil or through the whole profile. Top soil salinity, though fatal to young vines, allows the growth of more mature plants with well developed root systems. Before the establishment of nurseries and new vineyards, the top salty layer is removed; leaching of the soil by frequent irrigation is necessary, adequate water also ensuring good development in young plants. Mention is also made of soil improvement by pre-planting with lucerne and grasses.

279. KAŠ, V., AND PLATONOVÁ, R.

**Príspevek k biológii našich viničných půd.** (Contribution to the biology of our vineyard soils.)

*Sborn. Čsl. Akad. Zeměd.*, 1947, 19: 205-9, from abstr. in *Soils and Ferts*, 1950, 13: 2075.

Low microbial populations (especially of azotobacter) in productive vineyard soil were associated with incipient "soil sickness". Partial sterilization proved beneficial in promoting increased biological activity.

280. FRANC DE FERRIÈRE, P. J. J.

**Éléments fertilisants du sol et alimentation NPK de la vigne en 1947 et 1948. (The nutrient status of the soil and the NPK nutrition of the vine in 1947 and 1948.)**  
*Ann. agron. Paris, Sér. A*, 1950, 1: 485-93, bibl. 7.

This paper reports the results of additional studies on the nutrition of vines in the Atlantic region of France and in Alsace [see *H.A.*, 20: 2447], relating mineral deficiencies, as diagnosed by foliar analysis, to the NPK content of the soil. Nitrogen deficiency was found to occur where the total N content of the soil did not reach 0.085%. With eroded soils on slopes, deficiencies may best be remedied by the application of compost

or organic manures. The application of artificial fertilizers may be advisable on soils, normally well supplied with N, in periods of excessive moisture or drought, particularly during flowering. Soils containing less than 0.01% available  $P_2O_5$  (determined according to Dyer's method) require phosphate manuring, those with a  $P_2O_5$  content of 0.002% or less producing symptoms of severe deficiency. Vines growing on soils with a sufficiently high P content may benefit from an additional supply in periods of drought. All the vineyards examined were found to be deficient in potassium. Further studies are necessary to determine the lowest K content in the soil compatible with good viticulture, and the best mode of supplying potassium.

281. LOTT, W. L., SATCHELL, D. P., AND HALL, N. S.

**A tracer-element technique in the study of root extension.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 27-34, bibl. 7, being *Pap. J. Ser. N.C. agric. Exp. Stat.* 323.

The utility of radio-active phosphorus as an indicator of root extension was tested in a vineyard of muscadine grapes, with vines 18 feet apart in rows 14 feet apart. The results support inferences that two vines are desirable as buffers between plots in the same row, and that cross-feeding is negligible between rows in vineyards where the soil is disced occasionally. Applied phosphate was found to penetrate the soil in noteworthy quantities to depths ranging from 1 to 5 inches in 34 days with 5.75 inches of rain. [Authors' summary.]

282. GUKASOV, A. I.

**Sowing seeds of cover crops in irrigated vineyards.** [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 10, pp. 29-34.

Observations and trials are described leading to the conclusion that it is advantageous, in irrigated vineyards, to sow a seed mixture of perennial leguminous plants and grasses between the rows.

283. JARDINE, F. A. L.

**Pruning shy bearing grape vines.**

*Qd agric. J.*, 1950, 71: 91-4, illus.

Two shy bearing varieties, Purple Cornichon and Waltham Cross, were subjected to three pruning methods: (1) unilateral cordon short pruning, (2) Casanave cordon long pruning, and (3) Bordelaise espalier long pruning. Methods (1) and (3) are those most commonly used at present for these varieties in Queensland. Yield and growth records are tabulated for three and four years for the two varieties and suggest that the Casanave cordon system of long pruning may be better suited to them than the established methods. In this system the vine is trained as a unilateral cordon until the spurs have developed, after which the upper of the two canes at each spur is pruned to a rod of 5 or 6 buds and tied down to the main stem, while the lower cane is cut back to 2 buds. The trials also showed that Waltham Cross yields more heavily than Purple Cornichon, regardless of the system of pruning used.



## 284. LEYVRAZ, H.

Plantation et taille de quelques cépages rouges européens. (The training and pruning of some red European vine varieties.) *Rev. romande Agric. Vitic.*, 1950, 6: 84-7, illus.

Trials have shown that in French-speaking Switzerland highest quality in red wines is obtained from cup-shaped vines with 4 shoots which are lightly pruned. The two-pronged method of training combined with more severe pruning is best suited to vineyards aiming at the production of good table wines. Trellising is a suitable method of training on many of the less favourable sites. The 3 systems are illustrated and the results of many years' trials on the relation between method of training and yield and quality are tabulated. —Lausanne Res. Stat.

## 285. POTAPENKO, JA. I., AND ZAHAROVA, E. I.

The principle of rejuvenation in training and pruning the grape vine. [Russian.] *Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 38-44, bibl. 1, illus.

Notes are given on frost damage to vines in the various vine growing regions of Russia. The above-ground parts often suffer severely from frost in spite of winter protection, and an illustrated description is given of a method of training to promote recovery. In vines trained in this manner all branches arise from buds at ground level. When the plant is fully developed, i.e. in its fourth year, it is a fan-shaped espalier with 6 branches in the case of medium and slow growing varieties and with 12 in the case of more vigorous ones. About 4,000-5,000 vines of the weaker varieties and 2,500-3,500 of the vigorous ones are planted per ha.

## 286. MANARESI, A., AND OTHERS.

Sui danni che il tutore vivo arreca alla vegetazione ed alla fruttificazione della vite. (The damage caused by living supports to the growth and fruiting of the vine.) Reprinted from *Riv. Vitic. Enol. Conegliano*, 1950, No. 9, pp. 12, bibl. 4, illus.

Comparison in a number of vineyards on different farms in the neighbourhood of Faenza, Northern Italy, of the growth of vines trained on living as against inert supports shows that both growth and production are less on the living supports—such as fruit trees, maples, elms—and that the difference becomes more marked with time. Striking figures demonstrate this.

## 287. LECRENIER, A.

Contribution à l'étude des raisins de serre. (Contribution to the study of glasshouse grapes.) [Flemish, German and English summaries  $\frac{1}{2}$  p. each.] *Bull. Inst. agron. Gembloux*, 1950, 18: 75-88, illus.

An investigation on the relationship between the number of seeds and the weight of berries in 20 varieties of glasshouse grapes was made at the Institut Agronomique de l'État, Gembloux. The results, which indicate that there is a close relationship between these two factors, are presented in the form of graphs. Good fertilization is necessary if large berries are to be obtained. The position of the berry on the bunch did not affect its weight or the number of seeds. The

ratio weight of berries: weight of seeds is considered to be an indication of the fruitfulness of a variety.

## 288. MÜLLER-STOLL, W. R.

Wuchsstoffversuche mit Reben. II. Teil: Reaktionsweise von Samen, Keimlingen und nichtholziigen Organen der Weinrebe auf künstliche Wuchsstoffgaben.\* (Growth substance experiments with vines. II. The response of seed, seedlings and non-woody organs of the vine to applications of synthetic growth substances.)

*Züchter*, 1950, 20: 213-26, bibl. 47, illus.

For reasons as yet unknown the vine responds less to growth substance treatments than most other plants. Applications of aqueous solutions of heteroauxin and  $\beta$ -indolylbutyric acid to the seed improved germination somewhat but did not have any lasting effect. Several methods of treating seedlings failed to increase the rate of development. Unilateral application of these substances to tendrils induced negative curvatures, the intensity of which varied with the age of the organ. Young leaves responded with a hyponastic curvature or a curling up of the central lobe to an application of the paste to the underside of the central vein, while older leaves or tendrils hardly reacted. Growth substance solutions were found to induce root formation in stems. The following observations may be considered to be of direct practical importance: (1) A 24-hour pre-treatment of green cuttings with 0.005% heteroauxin improved rooting and yielded a much higher percentage of good plants. (2) Repeated spraying of the berries with 0.05-0.1% heteroauxin solution hastened maturity and improved the quality by 7-9° Oechsle in the two varieties examined. (3) The same treatment induced small, parthenocarpic berries to grow to almost normal size.—Bot. Inst. Potsdam-Sanssouci.

## 289. CARLONE, R.

Effetto dell'acido naftossiacetico sull'allegazione e sulla partenocarpia di alcuni vitigni. (The effect of naphthoxyacetic acid on flower-drop and on parthenocarp in vines.)

Reprinted from *Riv. Vitic. Enol. Conegliano*, 1950, No. 7, pp. 8.

$\beta$ -naphthoxyacetic acid, applied at various concentrations at different stages of flower development, increased flower drop and did not induce parthenocarp in the varieties Barbera and Harslevellü. It seemed to have some effect on seed development in the variety Bicano, but this was not confirmed because the germination of the seeds was not tested.

## 290. TOPI, M., AND BALDACCI, E.

Sul significato della convergenza sintomatologica delle alterazioni da 2-4D e da roncet (court-noué) nella vite. (The significance of the similarity of symptoms caused by treatments with 2,4-D on vines and those of court-noué.) [English summary 4 lines.]

*Phytopath. Z.*, 1949, 15: 393-401, bibl. 7, illus.

\* For part I, see *Gartenbauwiss.*, 1939, 19: 127-53 (H.A., 9: 834).

The authors show how the deformation of the foliage of vines treated with 2,4-D resembles that associated with court-noué, and suggest that the pathogenic action of certain viruses, bacteria and fungi can be compared with that of 2,4-D and other synthetic auxins.

291. LINDE, P. E., AND LE ROUX, M. S.

**Sampling of table grapes.**

*Fmg S. Afr.*, 1950, **25**: 247-8, bibl. 5.

Sampling trials on 4 grape varieties indicate that grapes conforming to the present minimum maturity requirements based on the ratio between total soluble solids and acid are not ripe enough to satisfy the taste of most consumers.—Western Province Fruit Res. Stat., Stellenbosch.

292. SISAKJAN, N. M., AND MARUTJAN, S. A.

**Saccharose in grapes.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, **61**: 491-4, bibl. 10 [received 1950].

It is shown that the conclusions of previous workers who stated that saccharose was absent in ripe grapes of European varieties of vine are incorrect.

293. PLAKIDA, E. K., LAGUTINSKAJA, N. S., AND NEMIROVSKAJA, E. I.

**An experiment in storing grapes with phytoncides.** [Russian.]

*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 10, pp. 46-8, illus.

Experiments are described in which grapes were kept in a fresh condition for up to 4 months by confining them in closed tubs together with shreds of horseradish. The results are attributed to the antiseptic action of a "phytoncide", an emanation from the horseradish.

294. POLLARD, A.

**Wine from the garden.**

*Fruit Year Book*, 1950, pp. 110-14.

This account of the author's own small-scale experiments in wine-making from Black Hamburg and other not specifically wine-grape varieties grown in the open in this country will be encouraging to amateurs.

295. SCHÄR, A.

*Zur Technik der Gewinnung von Traubenkernöl in der Schweiz.* (The manufacture of grape seed oil in Switzerland.) [French summary 17 lines.]

*Landw. Jb. Schweiz*, 1950, **64**: 715-28.

From 1941 to 1946, 500 tons of grape seed oil were produced in Switzerland, both for technical purposes and as an edible oil. The quality of the latter is reported to be comparable with that of olive oil. Manufacture and characteristics of the oil are discussed.

**Nuts.**

(See also 124, 127, 300a, d, j, l, 1194, 1222.)

296. REBOUR, H.

*Le pacanier en Afrique du Nord.* (The pecan in North Africa.)

*Rev. hort. Paris*, 1949, **121**: 159, illus.

A brief note on the performance of pecans planted at the Station Expérimentale d'Arboriculture at Boufarik,

Algeria, in 1929, and on the possibilities of pecan growing in North Africa generally. The areas of production are limited by the high water requirements of the tree, as it does not do well under irrigation.

297. OZOL, A. M.

**Growing walnut trees around Moscow.**

[Russian.]

*Agrobiologija* (Agrobiology), 1950, No. 2, pp. 135-9, illus.

In trials aimed at obtaining walnut trees resistant to frost for growing around Moscow, nuts were collected from various regions of the U.S.S.R.; seedlings were raised from them and grown in Moscow gardens. The trees made good growth and many were not injured by severe frost. They were found to comprise two groups in relation to their winter hardiness. Those originating from the Black Sea coast and from the mountains of northern Caucasia were susceptible to injury and some of the trees perished while young, others being severely injured. They grew as bushes with vigorous shoots arising from the base of the stem. Those from Ukrainian steppes, the mountainous parts of middle Asia and the eastern regions of northern Caucasia were much more resistant, and only in exceptional cases in very severe winters were one-half to two-thirds of the young shoots injured by frost.

298. MAURER, K. J.

**Ein Beitrag zur Walnuss-Freilandveredlung.** (Outdoor walnut budding.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, **59**: 345-8, illus.

Patch budding, as carried out and taught at the Horticultural Institute, Geisenheim/Rhein, is briefly outlined and well illustrated. The work is carried out in May/June with breaking buds, or in July/August with dormant buds. 80-95% success is claimed for this method.

299. ŠČEPOTJEV, F. L., AND BORISENKO, T. T.

**The germination of walnut pollen (*Juglans regia* L.) in an artificial medium.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, **68**: 617-20, bibl. 2.

Walnut pollen does not germinate in water or in water with saccharose and various stimulants. It germinates well in a 0.5 N solution of glucose, but the pollen tubes become ruptured at their tips and the method can only be used to test viability. The pollen, when kept under room conditions, loses its viability by about the third day, but the time can be extended (up to 2 weeks) by keeping it on ice.

**Noted.**

- 300.

a AJBAN, A.

*Contribution à l'étude des maladies des noyers en France. Le parasitisme du noyer par *Gnomonia leptostyla* (Ces. et de Not.), (*Marsonia juglandis* (Lib.) Sacc.) et son cycle évolutif. (Walnut diseases in France. The parasitism of *Gnomonia leptostyla* and its life history.)*

*Thèse Fac. Pharm. Univ. Strasbourg* **270**, 1941, pp. 70, bibl. 17, illus. [received 1950].



- b ANSTEY, T. H., AND WILCOX, A. N.  
The breeding value of selected inbred clones of strawberries with respect to their vitamin C content.  
*Sci. Agric.*, 1950, 30: 367-74, bibl. 13, being *Pap., sci. J. Ser., Minn. agric. Exp. Stat.* 2558.
- c BRANAS, J.  
Plants et plantations. (Plants and planting [of vines].)  
*Progr. agric. vitic.*, 1950, 134: 292-8.
- d COLE, J. R.  
Bordeaux mixture alone or bordeaux mixture followed by Ziram may be used to control pecan scab [*Cladosporium effusum*].  
Abstr. in *Phytopathology*, 1950, 40: 786.
- e DALMASSO, G.  
Contributo allo studio della biologia florale della vite, I.  
DALMASSO, G., AND COSMO, I.  
Contributo allo studio della biologia florale della vite, II. (Contributions I and II to the study of the floral biology of the vine.)  
Reprinted from *Annuar. R. Staz. sper. Vitic. Conegliano*, 1934, Vol. 4, No. 11, and 1941, Vol. 10, pp. 37 and 3 plates, bibl. 32, and pp. 69 and 8 plates, bibl. 44 [received 1950].
- f DOEHLERT, C. A.  
Blueberries in the garden.  
*Circ. N.J. agric. Exp. Stat.* 538, 1950, pp. 4, illus.
- g GUKASJAN, A. S.  
Viticulture in the Kazahstan parts of the open steppe region. [Russian.]  
*Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 10, pp. 19-20.
- h MERŽANIAN, A. S., AND STOEY, K. D.  
The co-ordinated effect of invertase and amylase in vine stems. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1209-12, bibl. 19 [received 1950].
- i OFFICE INTERNATIONAL DU VIN.  
VI<sup>e</sup> Congrès international de la Vigne et du Vin. Athènes, 25 Août-2 Septembre 1950. (6th International Congress on Viticulture and Wine. Athens, 1950.)  
Resolutions adopted by the congress.
- j STATENS FØRSØGSVIRKSOMHED I PLANTEKULTUR.  
Orienterende sortsforsøg med hassell. 1934-48. (Preliminary hazel variety trials 1934-48 [in Denmark].)  
*Tidsskr. Planteavl*, 1950, 53: 728-31, being *Medd. Statens Forsøgsvirks. Planteakult.* 436.
- k STOEY, K. D.  
The dynamics of the carbohydrates of vine stems in relation to the direction of formation and dissociation of di- and polysaccharides. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 1069-72, bibl. 13 [received 1950].
- l TURNBULL, J.  
Cobnuts and filberts.  
*Fruit Year Book*, 1950, pp. 106-9.
- m WESTERN REGIONAL RESEARCH LABORATORY, ALBANY, CALIF.  
Application of wax treatment to berry boxes (hallocks) to control molds. [Publ.] *U.S. Dep. Agric. AIC-270*, 1950, pp. 5, illus.

## PLANT PROTECTION OF DECIDUOUS FRUITS.

### General.

301. HUNTER, A. W. S., AND WHITE, F. H.  
Breeding for disease-resistance in Canada. Part III. Horticultural crops and tobacco.  
*Emp. J. exp. Agric.*, 1950, 18: 218-26, bibl. 19.

An account is given of the plant breeding work in progress in Canada with potatoes (resistance to late blight, common scab, leaf-roll and aphids), tomatoes (leaf-mould), peas (diseases caused by *Ascochyta* spp.), apples and pears (scab, crown-rot and fire-blight), strawberries (red stele and foliage diseases), raspberries (anthracnose and spur blight), currants (blister rust) and tobacco (black root-rot, brown root-rot and mosaic).

302. BERAN, F., BÖHM, H., AND WENZL, H.  
Kurze Anleitung zur Schädlingsbekämpfung im Obstbau. (A short guide to the control of fruit pests and diseases.)  
*Bundesanstalt für Pflanzenschutz*, Vienna, 1950 [?], pp. 61, illus.

The 26 coloured illustrations of pests and of symptoms of pests and diseases printed from water colours by

P. P. Kohlhaas are an outstanding feature of this booklet.

303. BAUDEWIJN, J.  
Quelques essais de lutte contre les maladies dans la culture fruitière. (Some experiments on the control of fruit tree pests and diseases.)  
*Rev. Agric. Brux.*, 1950, 3: 403-5.

The results are reported of small-scale trials carried out at Hasselt, Belgium: (1) Ground treatment against apple scab; inconclusive. (2) An application of 1% copper oxychloride in November—i.e. before the leaves drop—appears to have a favourable effect on the control of bacterial canker of cherries and to be a substitute for the pre-blossom spray. (3) The bark of pear trees attacked by the green buprestid beetle was scraped in winter and the trees received a generous application of a complete fertilizer. In May, before oviposition, the stems and main branches were given two coatings of different DDT-oil-lime mixtures or of a parathion preparation. As a result of the treatments the trees were saved—at least temporarily. (4) Trials

on the possibility of substituting parathion for winter washes in apples remained inconclusive.

The relative susceptibility of several varieties is indicated.

304. HORTICULTURE DIVISION, N.Z. DEPARTMENT OF AGRICULTURE.

**Control of orchard diseases and pests by spraying.**

*Bull. N.Z. Dep. Hort.* **161**, [undated], pp. 11 [received 1950].

The most common orchard fungi and pests that are controlled by spraying are mentioned, and preparations for their control are described, with spray schedules for apples, pears, stone fruits and citrus.

305. PLANTENZIEKTENKUNDIGE DIENST.

**Goedgekeurde bestrijdingsmiddelen. (Approved control products.)**

*Vlugschr. PlZiekt. Dienst, Wageningen* **65**, 1950, pp. 4.

A list of proprietary products with the names of the Dutch firms supplying them, for the control of agricultural and horticultural pests, diseases, and weeds.

306. ANON.

**Precauciones necesarias en el uso de sustancias empleadas en terapéutica vegetal. (Precautions to be taken in the use of plant protective substances.)**  
*Idia*, 1950, 3: 28/29: 7-14.

These notes on the precautions that should be taken by workers handling any of 70 toxic or dangerous substances used in plant protection have been compiled from various American recommendations.

***Disturbances of nutrition or of unknown origin.***

(See also 176, 431c, d, s, 1214, 1221, 1231.)

307. FISHER, D. V., BRITTON, J. E., AND PORRITT, S. W.

**Some horticultural aspects of black-end of pears.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 217-23, bibl. 8, illus., being *Contr. Div. Hort. Dep. Agric. Canada* **720**.

In British Columbia the physiological disorder black-end or hard-end of pear fruits seldom causes losses of more than 5 to 10%, but in a few orchards losses exceed 50%. This paper reports a 4-year individual case history study of 91 Bartlett and Anjou trees affected by the disorder. The trees tended to maintain their relative degree of susceptibility each year, although there were notable exceptions to this rule. 75% or more of fruits showing hard-end symptoms at picking developed hard-end or black-end when ripened. Although black-end is said to be associated with the use of oriental rootstocks, notably *Pyrus serotina* and *P. ussuriensis*, it has been found on trees presumed to be on French pear seedlings; certainly the rootstocks involved show marked variation and attempts are being made to identify them. No consistent relationship has yet been found between amount of crop, soil type, fertilizer programme or age of trees and severity of black-end. Affected fruits were always most numerous on the inside portions of the tree, and it is suggested that such fruits be removed at thinning.

308. ROSS, E.

**A quantitative hardness test for "hard-end" of Bartlett pears.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 224-32, bibl. 5, illus., being *Sci. Pap. Wash. St. agric. Exp. Stats* **872**.

Apparatus is described and illustrated which has been used to test the hardness of the calyx area of Bartlett pears at the time of picking and before the existence or otherwise of the hard-end disorder can be determined. It involves recording the pressure needed to force the blunt end of a small piston a very small, but fixed, distance into the fruit without puncturing the skin. In trials with the tester it was found that for most purposes the "threshold value" for hardness was a pressure of near 60 lb./sq. in.; about 95% of pears showing pressures exceeding this figure developed hard-end on ripening, whereas a similar proportion showing lower pressures ripened normally.

309. HILL, H., AND MACARTHUR, M.

**Nutrition and soil management studies.**

*Progr. Rep. Div. Hort. centr. exp. Farm, Ottawa, 1934-1948*, 1950, pp. 96-123, bibl. 13, and in text.

**Soil management:** The sod mulch system of management has proved an effective method of maintaining soil fertility and tree vigour in apple orchards. K and Mg deficiencies, the fertility status of orchards and the influence of various elements on fruit quality in cold storage are discussed. Deficiency studies were also made with vegetables and flowers. Soil management in vegetable production and soilless growth are discussed. **Physiological disorders of apples.** (1) **Cork disorders.** Experimental data collected since 1931 are presented [see also *H.A.*, 7: 315]. These disorders, whether internal cork or corky-core, proved to be nutritional in nature and boron was found to control them. Soil applications of borax are suggested for acid soils, and spray applications for alkaline soils. (2) **Bitter-pit.** Symptoms of the two types, the typical bitter-pit and the blotchy-pit are described. No direct cause or control was established, though the restriction of excessive growth is recommended, with, in some cases, the substitution of sod mulch management for clean cultivation. (3) **Water-core.** The accepted view that water-core is more prevalent under high nitrogen conditions was confirmed. It was also found more prevalent on young trees first coming into bearing than on older ones.

310. THORNE, D. W., AND WANN, F. B.

**Nutrient deficiencies in Utah orchards.**

*Bull. Utah agric. Exp. Stat.* **338**, 1950, pp. 29, illus.

Symptoms of nitrogen, phosphorus, potassium, iron, manganese and zinc deficiencies on horticultural crops in Utah are described, and the distribution of these deficiency diseases in the state is shown on maps. Prevention and control of macro-nutrient deficiencies can be obtained by adequate and correct fertilizing, and of micro-nutrient deficiencies by spraying, injections and in some cases, simply through correct soil management.



## 311. HIRAI, K., AND HITSKA, J.

**Effects of boron on corky core of apples.**

[Japanese.]

*J. hort. Ass. Japan*, 1949, **18**: 183-6.

The experiments described were carried out on a red variety of apple very susceptible to corky core, growing in a garden where the soil water contained 0.20 p.p.m. of boron. One tree was 15 years old, the others 25. Around each tree a circular zone 75.8 cm. from the trunk and 3.03 m. wide was marked out, and an NPK fertilizer was applied. Three of the trees in addition received 112.5 g. and three 225 g. of borax, while four trees received NPK alone. The trees which received boron had no corky core the next year, while trees receiving NPK alone showed 100, 20 and 11% fruit with corky core. In two subsequent years only NPK was applied; again the trees previously receiving boron were free from corky core. The authors conclude that an affected tree can recover when treated with 112.5 or 225 g. borax.

## 312. McLARTY, H. R., AND WOODBRIDGE, C. G.

**Boron in relation to the culture of the peach tree.\***

*Sci. Agric.*, 1950, **30**: 392-5, bibl. 8, illus., being *Contr. Div. Bot. Plant Path.* **1018** and *Contr. Div. Chem., Sci. Serv., Dep. Agric.*, *Ottawa*, 179.

1. The outstanding characteristic of boron deficiency on peach is the dying-back in the spring of twigs and branches on trees which grew normally the previous season. 2. The symptoms of boron toxicity that are most readily recognized are small necrotic areas along the midrib of the leaf and small cankers on the underside of the midrib. 3. The results of the chemical analyses indicate that, if the boron content on a dry weight basis of the leaves is less than 20 p.p.m., or that of the twigs is less than 10 p.p.m., boron deficiency symptoms are very likely to be present. If the boron content of leaves is greater than 90 p.p.m., and that of twigs is greater than 110 p.p.m., boron toxicity symptoms will most probably be apparent. Normal leaves and twigs contain 17 to 40 p.p.m. and 10 to 37 p.p.m., respectively. [Authors' summary.]—Dominion Laboratory of Plant Pathology, Summerland, B.C.

## 313. BOYNTON, D., AND EMBLETON, T. W.

**Further studies on magnesium deficiency of the apple and its control.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 21-6, bibl. 9.

This paper summarizes observations made since 1944 on magnesium deficiency of apple orchards in New York State. [For more detailed reports of earlier papers see *H.A.*, 16: 132, 17: 1283 and 19: 1115.] Aspects considered here with the support of tabulated data are:—(1) Responses of Mg deficient trees to dolomitic limestone. Slow recovery resulted from an application of 100 lb. limestone per tree, and 6 years later, in a year when Mg deficiency symptoms were particularly severe, the contrast between treated and untreated trees was marked. Leaf analyses showed Mg to be doubled in the treated trees, but K to be reduced and Ca reduced slightly. The weights of small

roots under the limed trees were much less than under the untreated, suggesting that the high concentration of lime inhibited root growth directly beneath it. (2) Data are given for trees bearing a heavy crop which tend to confirm that when the Mg content of median leaves in midsummer falls below 0.25% of dry weight the trees are approaching incipient Mg deficiency. (3) The base status of soils in New York orchards is discussed in relation to Mg deficiency. Evidence is presented which shows that in some cases Mg deficiency has resulted from heavy dressings of K and in others from acidification due to sulphur sprays. The effect in the latter case is also a reduced Mg: K ratio, because Ca and Mg disappear at a faster rate than replaceable K.

## 314. MIKKELSEN, D. S., AND DOEHLERT, C. A.

**Magnesium deficiency in blueberries.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 289-92, bibl. 3, illus.

An abnormal chlorosis in several fields of blueberries on sandy soil near Pemberton, New Jersey, has been identified as due to Mg deficiency. Applications in the autumn of 70 lb. MgO as Epsom salts or 300 lb. MgO as hydrated dolomitic limestone corrected the trouble. The Mg content of the leaves of chlorotic plants before and after treatment and of normal healthy plants is tabulated. Mg fertilization increased the Mg content of the leaves and their milliequivalent cation composition, but had little effect on their contents of P, Fe and Mn.

## 315. MULDER, D.

**Der Zinkmangel im europäischen Obstbau. (Zinc deficiency in European orchards.)**

*Phytopath. Z.*, 1950, **16**: 510-11.

Zinc deficiencies had been reported for Hungary, Denmark and Holland. The author now includes France (Versailles) and Switzerland, particularly in apple, and Holland in apple, pear and cherry. One of the factors involved in this disorder is the condition of the soil, particularly when the phosphorus content is very high, though this does not imply that in all soils with a high phosphorus content there will be zinc deficiency. There appear to be other factors concerned, such as low content of clay or of humus colloids, and high calcium content.

## 316. KASTENDIECK, M.

**Rosettenkrankheit und Boden. (Rosette disease and soil conditions.)**

*Phytopath. Z.*, 1950, **16**: 511-12.

A short article confirming the conclusions of Mulder [see preceding abstract] that a high pH (7.8), with high phosphate in a light soil, may lead to zinc deficiency.

## 317. BROUGH, C. R.

**Zinc deficiency in deciduous fruit trees in Victoria.**

*J. Dep. Agric. Vict.*, 1950, **48**: 257-9, illus.

Deficiencies of zinc in deciduous fruit trees occur in many of the fruit-growing districts of Victoria and are particularly important in the Harcourt, Goulburn Valley, Quantong, and Horsham districts. The symptoms are described and dormant and foliage applications of zinc sulphate sprays are recommended.

\* A summary of this work appeared previously as an abstract in *Phytopathology*, 1949, **39**: 860, see *H.A.*, 20: 123.

*Climatic factors.*

(See also 33, 275-277, 297, 951, 1216, 1226.)

318. BRIERLEY, W. G., ALDERMAN, W. H., AND WEIR, T. S.

**Winter injury to apple trees in Minnesota 1947-48.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 259-61, illus., being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2496.

Injury, in some cases severe, occurred in otherwise "hardy" apples in Minnesota during the 1947-48 season. Shoot tip and bud and spur injury was determined for 20 varieties. The damage is attributed to the combined effects of a heavy crop, drought, depleted food reserves, immaturity in the early winter, and the loss by 11 March of cold resistance developed earlier.

319. EDGERTON, L. J., AND HARRIS, R. W.

**Effect of nitrogen and cultural treatment on Elberta peach fruit bud hardiness.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 51-5, bibl. 5.

Bearing Elberta peach trees in two orchards in New York State received four treatments in 1 and 2 years respectively: Nitrogen at 0.3 or 0.5 lb. *versus* 1.0 lb. per tree, and, superimposed on these, clean cultivation *versus* a rye grass cover crop. Cold hardiness determinations were made on fruit buds by a controlled direct freezing method using a modified deep-freeze cabinet. Data are tabulated for bud survival on various dates at different temperatures down to  $-15^{\circ}$  F. and for shoot growth and the leaf and twig nitrogen content of the trees. Higher nitrogen content and greater shoot growth resulted from higher nitrogen fertilizer applications particularly with clean cultivation, but the cold hardiness of the buds was not appreciably affected by the treatments.

320. BRIERLEY, W. G., AND MCCARTNEY, J. S.

**A study of the cold resistance of European plums.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 254-8, illus., being *Pap. sci. J. ser. Minn. agric. Exp. Stat.* 2508.

A large number of European plum varieties was involved in comparing the behaviour of severed terminal shoots kept under controlled low temperature conditions with the survival of trees in an orchard in Minnesota in the unusually cold winter of 1947-48. Close agreement was obtained between the survival rating of the trees in the orchard over a 6 to 9 year period and the survival of shoots exposed to  $-50^{\circ}$  F. for 8 hours. Agreement was less close where shoots were exposed to  $-40^{\circ}$  F. and  $-30^{\circ}$  F. The results indicate that varieties of *Prunus insititia* are generally somewhat harder than varieties of *P. domestica*, but that some varieties of the latter seem able consistently to withstand temperatures as low as  $-40^{\circ}$  F.

321. HASKINS, G.

**Orchard sites and frosts.**

*Amer. Fruit Gr.*, 1950, **90**: 11, 20.

A study of 82 orchard locations, carried out in 1949 in Ohio, showed that sites close to Lake Erie and on level land were much more subject to spring frost than

sites 8-10 miles from the lake but on elevations and slopes. The only advantages possessed by the narrow belt along the lake are that date of bloom and growth of plants are retarded. Elevation, on the other hand, proved no guarantee against frost, though the better sites averaged 157 feet higher than the poorer ones. Air drainage was found to be one of the most important factors, the "above average" sites having an average slope of 3.03% as compared to 1.24% for the "below average" sites. The less the slope, the more important is it that no obstacles, such as woods or ridges, should obstruct the downward flow of cold air.

322. JEFFREE, J. H.

**Some experiments on the protection of fruit against spring frost.**

*Fruit Year Book*, 1950, pp. 100-4, illus.

In experiments in a private garden good protection was given to apples and pears and to various flowering shrubs [unspecified] by overhead irrigation applied at the rate of one-tenth of an inch or more per hour. The results with an Early Rivers plum tree and black and red currants were less satisfactory. The traditional method of "washing off" the frost repeatedly at short intervals proved worse than useless.

323. "EDDE."

**Frostskadad Frukt. (Frost-injured fruit.)**

*Fruktodlaren*, 1950, No. 5, pp. 181-2.

In two cold nights on 31 May and 1 June, 1950, the water in the calyx of young apple fruits froze and caused damage to the surrounding cells. A photograph illustrates a necrotic ring of injured tissue around the calyx of ripe apples. Fruits of this type were harvested to a greater or lesser extent in all parts of Sweden.

324. REICH, —.

**Sonnenbrand bei Äpfeln. (Sun scald in apples.)**

*Mitt. ObstbVersuchsring Jork*, 1950, No. 17/18, pp. 98-9, illus.

In the summer of 1950 solar radiation caused injury to apples in the Altenland, Germany, where spraying could be ruled out as a contributory factor.

325. HIGDON, R. J.

**The effects of insufficient chilling on peach varieties in South Carolina in the winter of 1948-49.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 236-8, bibl. 1.

Following the mild winter of 1948/49 with only 664 hours at or below  $45^{\circ}$  F., peaches in the Sandhills area of South Carolina showed delayed foliation and blossoming. The behaviour of 35 varieties is tabulated and discussed briefly.

326. STOECKELER, J. H.

**Shelter belts in Italy.**

*Foreign Agric.*, 1950, **14**: 196-8, illus.

An account is given of the planting of shelter belts in the Agro-Pontino reclamation area to give protection against hot dry summer winds and to provide fuel. Among a number of species mentioned as being used, the Longbeak eucalyptus has proved outstanding, followed by the Monterey cypress and Monterey pine.



The author suggests several other American species for trial.

327. GAYFORD, G. W.

**Orchard notes: Windbreaks for orchards.**

*J. Dep. Agric. Vict.*, 1950, 48: 220-2, illus.

General notes are given on windbreaks for orchards in Victoria, with brief references to the use of *Pinus radiata*, *Cupressus* spp., *Eucalyptus* spp. and other trees. It is stated that olives, figs and almonds are sometimes used for windbreaks and are quite a profitable sideline if properly maintained.

328. BELOHONOV, I. V.

**Planting of fruit trees in protective woodland strips.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 3-10, illus.

It is planned to plant protective forest belts on the steppes of European Russia on a vast scale. 10-15% of these woodland strips are to consist of fruit trees, amounting to approximately 750,000 ha. of new fruit plantations. Seedling trees are considered to be suitable material for this type of planting, and hopes of gaining valuable new varieties through selection are entertained. The Mičurin Scientific Research Station makes recommendations as to the varieties of fruit to be grown in the various regions under consideration. The types of protective strips and the place of fruit trees in them, their planting out, cultural measures, plant protection and harvest are discussed.

### Viruses.

(See also 431t, 1190, 1220.)

329. LUCKWILL, L. C.

**Some virus diseases of fruit trees in England.**

*Fruit Year Book*, 1950, pp. 84-8, illus.

Recent surveys have revealed that virus diseases are of widespread occurrence on pome and stone fruits in this country. Some of them are capable of causing considerable crop losses and, as a result of vegetative propagation, it is to be expected that virus troubles will become progressively more widespread unless active measures are taken to control them. A note is given here on the recognition of virus diseases, and some of the more outstanding virus symptoms which have been recorded in England on pome and stone fruits are catalogued and illustrated.

330. COCHRAN, L. C.

**Infection of apple and rose with the ring-spot virus.**

Abstr. in *Phytopathology*, 1950, 40: 964.

Experiments mentioned indicate that the ring spot virus of peach may be transmitted to apple by grafting, and evidence was obtained that ring spot occurs naturally in rose.

331. BLODGETT, E. C., GRAHAM, S. O., AND WILLIAMS, H. E.

**Virus studies on seedling rootstocks from mahaleb and mazzard trees.**

Abstr. in *Phytopathology*, 1950, 40: 963-4.

An account of extensive indexing of seedling rootstocks of mahaleb and mazzard cherry in connexion with the Nursery Improvement Programme in Washington State. Virus in parent trees varies widely but

appears to be the more prevalent in the mazzard trees. Propagation from parent seedlings on uniform mahaleb understock gave good evidence that factors adversely affecting growth and producing leaf patterns were transmitted, particularly in cases that gave a positive reaction on peach indexing.

332. LOTT, T. B.

**Some further observations on small bitter cherry.**

*Sci. Agric.*, 1950, 30: 444-6, bibl. 1, illus., being *Contr. Div. Bot. Plant Path.*, *Dep. Agric.*, Ottawa, 1040.

In the Okanagan Valley, B.C., transmission of the disease by grafting has been obtained on a Bing tree after an unusually long incubation period. Small bitter cherries were found in the Lambert variety in addition to the Bing variety [see *H.A.*, 17: 2091]. The rate of spread has differed widely in different trees, but a general increase in natural infection is evident. The disease has only been found where the virus disease Western X is fairly common in peach, but no relationship has yet been established between the two.

333. RICHARDS, B. L., AND WADLEY, B. N.

**Utah Dixie rusty mottle of sweet cherry.**

Abstr. in *Phytopathology*, 1950, 40: 969.

A new virus disease of the sweet cherry, locally referred to as Dixie rusty mottle, has been recognized as a serious factor in sweet cherry production in Utah since 1945. The virus from sweet cherry has been transmitted by bud and chip grafts to Bing, Lambert, Napoleon, Black Tartarian, and Mazzard, to varieties of sour cherry, and to several varieties of peach.

334. ZELLER, S. M., AND MILBRATH, J. A.

**The recovery of western X-disease of peach from Montmorency cherry and its relation to buckskin of sweet cherry.**

*Phytopathology*, 1950, 40: 707-11, bibl. 7, illus.

A little-cherry disease of Montmorency cherry is described. The virus has been transmitted to peach, and to Montmorency and Black Republican cherries. Experiments indicated that western X-disease of peach, red-leaf of chokecherry, and buckskin of sweet and sour cherries in Oregon are caused by the same virus.—Oregon agric. Exp. Stat.

335. COCHRAN, L. C.

**Passage of ring-spot virus through peach seeds.**

Abstr. in *Phytopathology*, 1950, 40: 964.

Ring-spot virus from seedlings of infected trees produced severe symptoms in test trees similar to those observed in the mother seed trees.

336. RICHARDS, B. L., AND WADLEY, B. N.

**Status of our knowledge of the western-X virus in Utah.**

Abstr. in *Phytopathology*, 1950, 40: 969.

In Utah the western-X virus causes western-X disease in peach, red-leaf disease in chokecherry, wilt and decline and western-X little cherry in sweet and sour cherries. Peach and cherry orchards in northern Utah often have 40% to 80% infected trees.

337. WEATHERS, L. G., AND COCHRAN, G. W.  
**Transmission of components of the western-X virus complex to herbaceous plants.**  
 Abstr. in *Phytopathology*, 1950, 40: 970.

Part of the western-X virus complex, presumably the western-X virus itself, was transmitted by means of dodder, *Cuscuta campestris* and *C. subinclusa*, from diseased peach to carrot, periwinkle and parsley. In field experiments, tomatoes connected to diseased peaches with *C. subinclusa* developed a necrosis and wilt resembling the tip-blight disease of tomato.

338. DEMAREE, J. B.  
***Fragaria vesca* as an index plant for some virus diseases of strawberry.**  
 Abstr. in *Phytopathology*, 1950, 40: 870.

A clone of *Fragaria vesca*, obtained from the East Malling Research Station, Kent, England, has been given preliminary trials at the Plant Industry Station, Beltsville, Maryland. These tests have shown that *F. vesca* is a much more suitable indicator plant for strawberry yellows than the American variety, Marshall, hitherto used.

339. WADE, G. C.  
**Strawberry diseases in Tasmania.**  
*Tasm. J. Agric.*, 1950, 21: 95-9, bibl. 1, illus.

Descriptions are given, with recommendations for control, of the virus diseases crinkle and yellow edge, the fungus diseases leaf spot (*Mycosphaerella fragariae*), leaf scorch (*Diplocarpon earliana*), root rot and fruit rot, and non-parasitic disorders.

340. ANON.  
**Crinkle disease of strawberry.**  
*Agric. Gaz. N.S.W.*, 1950, 61: 366-7, illus.

The virus of crinkle disease has invaded most commercial varieties of strawberry grown in New South Wales, and growers are finding the crop unprofitable. The symptoms are described, and roguing is recommended for control.

341. GALLAY, R., AND OTHERS.  
**La dégénérescence infectieuse de la vigne. (Infectious degeneration of the vine.)**  
*Rev. romande Agric. Vitic.*, 1950, 6: 81-4.

The second year's observations in experimental vineyards grafted with scions from "degenerated" vines (see *H.A.*, 20: 2503) prove beyond doubt that the disease is graft-transmissible. The symptoms of infectious degeneration are described and data are presented on the effect of the trouble upon yield (a considerable reduction), length of shoots, variegation in shoots and leaves, fasciation, nodes and some other characters. Nurserymen in French-speaking Switzerland, where the disease has been reported from several places, are urged to exercise great care in the selection of budwood. Certain observations point to the possibility that the soil may be a factor in the transmission of infectious degeneration. For the time being new vineyards should not, therefore, be planted on sites previously affected with the malady.—Lausanne Res. Stat.

342. HEWITT, W. B.  
**Fanleaf of grapevines in California.**  
 Abstr. in *Phytopathology*, 1950, 40: 966.

The symptoms of this disease are: early season dwarfing; shoot and leaf deformity; mottling and puckering of young leaves; flower cluster shelling; and recovery of the vine to apparently normal growth by midseason. Shoots are spindly, have short internodes and tend to zigzag at the nodes. Young leaves cup slightly inward and stand upright along the axes of new shoots. The disease is being spread either in the rootstock or in the scion wood.

343. BOUBALS, D., AND HUGLIN, P.  
**Sur la localisation et la transmission d'une mosaïque nécrotique de la vigne. (The location and transmission of a necrotic mosaic of the vine.)**  
*Progr. agric. vitic.*, 1950, 134: 343-9, bibl. 6, illus.

A necrotic mosaic of the leaves of a clone of a hybrid vine is described, and sections cut through the necrotic areas are shown in drawings which indicate that the necrosis starts at the stomata. It is propagated by cuttings and transmitted by grafting, and so is considered to be a virus disease.

### Bacteria.

344. NICOLINI, J. C.  
**Tuberculosis del olivo. (Tuberculosis of olives.)**  
*Idia*, 1950, 3: 28/29: 14-15.

The main centres of infection in the Argentine of the bacterial disease tuberculosis of olives (caused by *Pseudomonas savastanoi*) are indicated on a map. The symptoms are described and the following control practices suggested: (1) use healthy propagating material for stock and scion; (2) give preventive sprays of 1% bordeaux after frosts or hail; (3) cut out and burn infected wood, and disinfect all wounds and pruning implements with carbolic acid. Wounds should then be covered with a vegetable tar. The Bacteriological Section of the Institute of Plant Protection is now determining the incubation period of the disease in different parts of the Argentine and at different times of year, as a basis for quarantine regulations. The areas most suitable for propagation purposes are also being determined.

345. MONTGOMERY, H. B. S.  
**Bacterial canker of plum trees.**  
*Gr. Digest*, 1950, 2: 1: 23-6.

A review of work on bacterial canker carried out at the East Malling Research Station.

### Fungi.

(See also 113, 339, 1193, 1198.)

346. MUSKETT, A. E.  
**Seed-borne fungi and their significance.**  
*Trans. Brit. mycol. Soc.*, 1950, 33: 1-12.

This presidential address to the British Mycological Society deals chiefly with the fungous spores carried with the seeds of cereals and flax, but references are made to mycelium carried within tubers and in or on parts used for the propagation of certain horticultural plants. It concludes with these words: Apart from the limitations imposed by unsuitable environment, only the widest of the oceans would seem to provide



anything like a satisfactory barrier against their penetration and infiltration so peaceful and so unobserved. It is clear, therefore, that problems relating to improvement in the health of seeds and planting stocks are international in character and will eventually have to be dealt with accordingly. This may be yet another means whereby thinking men and women may be brought together for the purpose of devising some improvement of the common lot, and thereby constitute but another example of the significant contribution which science can make to the humanities and so bring a measure of real relief to a muddled and bewildered world.

347. LOEWEL, E. L., AND REICH, H.

Die Ergebnisse unserer diesjährigen Spritzversuche (1949) unter besonderer Berücksichtigung der Bekämpfung von Fusikladium (*Venturia inaequalis*). (Results of 1949 spraying trials with special reference to apple scab.)

Reprinted from *Z. Pflkrankh.*, 1950, 57: 99-106.

1949 was a serious scab year, particularly in north-west Germany, owing to the high rainfall from March to the end of July. An account is given of winter spraying with various materials against the eggs of apple pests. Carbolineum was very effective against the eggs of aphids and apple sucker. Eggs of winter moths and apple blossom weevil were destroyed by dinitrocresol, and a combination of tar-oil and DNC was very effective. As a result of the early leafing, interrupted by frost nights, mineral oil alone or combined with DNC caused much bud damage and retarded leafing more than did tar-oil, and should be applied before Christmas or during frost-free days of January or February. Against scab the first spraying was carried out before spore dissemination at a time when the early flowering varieties Boskoop, Gravenstein, etc., showed the first green tips of the leaves. Bordeaux mixture proved superior to copper oxychloride even when they had the same copper equivalent. It is considered that in a bad scab year, such as 1949, bordeaux mixture is to be preferred. Two preparations, Fuklasin and Nirit, were tried, but proved unsatisfactory for pre-blossom spraying. The second spray was applied just before flowering, for observations have shown that, particularly in years of delayed blossoming from cold weather at the end of April, the chief spore dispersion was during blossoming. In post-blossom spraying  $\frac{3}{4}\%$  copper oxychloride gave better results than Fuklasin and Nirit. Data are given showing better results from Fuklasin and Nirit with lead arsenate than when used alone. Pre-blossom spraying with lime-sulphur and lead arsenate was less effective than Fuklasin and lead arsenate.

348. HARRIS, W. B.

Ground sprays for the control of apple scab.

*J. Dep. Agric. S. Aust.*, 1950, 53: 543.

Notes on trials in America and in South Australia. The material most generally used is a salt of dinitro-ortho-cresol. It is sprayed on the fallen leaves at  $\frac{1}{2}$  to 1% and has been found effective in reducing the discharge of ascospores in spring. Trials in South Australia resulted in about 10% improvement.

349. HAFIZ, A.

Apple and pear scab.

*Punjab Fruit J.*, 1950, 14: 29-32, illus.

Scab attacks all varieties of apple and pear in Pakistan especially in humid weather. Good control can be obtained by spraying with lime-sulphur or bordeaux mixture, to which lead arsenate may be added. Spraying is preferred to dusting. Control is assisted by proper pruning, good drainage and the avoidance of mixed variety stands.

C.W.S.H.

350. BERNAUX, P.

Extension au Midi méditerranéen de trois maladies cryptogamiques. (The appearance in the Mediterranean region of southern France of three cryptogamic diseases.)

*Progr. agric. vitic.*, 1950, 134: 208-14, bibl. 13.

Three diseases recently discovered in southern France, and here described, are: cherry anthracnose (*Coccomyces hiemalis*); piriculariose of rice (*Piricularia oryzae*); and powdery mildew of the ten-weeks stock (*Oidium matthiolae*).

351. JOHNSON, F.

The effect of several spray materials on the control of blossom blight in sour cherries.

Abstr. in *Phytopathology*, 1950, 40: 967.

The percentage of disease (caused by *Sclerotinia laxa* and *S. fructicola*), based upon the number of blighted blossom spurs, is listed after each of the sprays tried at the concentration given for each 100 gal. water as follows: Arathane, 1 qt., 15.5; Ferbam,  $1\frac{1}{2}$  lb., 2.2; Phygon-XL,  $\frac{3}{4}$  lb., 2.6; Roccal 10%, 2 qt., 2.3; Puratized agricultural spray, 1 pt., 1.0; lime-sulphur,  $2\frac{1}{2}$  gal., 7.0; 341-C, 1 qt., plus 1 lb. hydrated lime, 1.6; control, 25.0.

352. BÖHNI, E.

Untersuchungen über die Bitterfäule an Kirschen. (Bitter rot of cherries.)

*Phytopath. Z.*, 1949, 15: 333-75, bibl. 45, illus.

A biological study of *Gloeosporium fructigenum* is described, with particular reference to infection of cherries, but other hosts are mentioned. There is a brief reference to control measures by spraying with copper-containing preparations.

353. ANON.

Spraying programmes for control of fungous diseases of coastal peaches.

*Agric. Gaz. N.S.W.*, 1950, 61: 406, 423.

Composite programmes are given for early, mid-season, and late varieties of peaches grown in coastal districts of New South Wales, the main fungus diseases of peach trees in this area being brown rot (*Sclerotinia fructicola*), leaf curl (*Taphrina deformans*), freckle (*Cladosporium carpophilum*) and rust (*Puccinia prunispinosae*).

354. NAEF-ROTH, S.

Untersuchungen über den Erreger der Schrotschusskrankheit des Steinobstes, *Clasterosporium carpophilum* (Lév.) Aderh., und über den Schrotschusseffekt. (The shot-hole fungus of stone-fruit trees, and the shot-hole effect.)

*Phytopath. Z.*, 1949, 15: 1-38, bibl. 39, illus.

An account of the morphology and biology of the fungus with special reference to its mode of parasitism and the abscission of the infected areas to cause the "shot holes".

355. SHARVELLE, E. G., AND TELLER, M. N.  
**Control of brown rot.**

*Phytopathology*, 1950, 40: 778-80.

Experiments were carried out on the Sapa variety of the cherry-plum hybrid in 1945. The percentage fruit infection on sprayed trees, when there was sufficient inoculum in the vicinity to cause 80% infection, was: wettable sulphur, 4.1; wettable sulphur + Tennessee Copper 34, 1; Fermate, 1.7; commercial Fermate, 1.8. These preparations did not prevent serious storage rots.—Minn. agric. Exp. Stat.

356. SHARVELLE, E. G., AND TELLER, M. N.  
**The value of copper fungicides for the control of strawberry leaf spot.**

*Phytopathology*, 1950, 40: 777-8.

In trials with copper fungicides for the control of strawberry leaf spot (*Mycosphaerella fragariae*) none of the materials tested (including bordeaux mixture) proved satisfactory and they cannot be recommended for replacing tribasic copper sulphate.

357. WILHELM, S.  
**Verticillium wilt in acid soils.**

*Phytopathology*, 1950, 40: 776-7, bibl. 5.

Verticillium wilt is a principal factor limiting the growing of strawberry, boysenberry, youngberry, and tomato in Santa Cruz County, California. Soils in this county range in general from pH 5.5 to 6.5. In San Joaquin County tomato fields in peat soils with pH as low as 4.5 have 80% to 90% affected plants, and cabbage and brussels sprouts in other counties on soils usually well in the acid pH range have been severely affected. It is concluded that the occurrence and severity of verticillium wilt is not greatly affected by soil reaction within the range in which susceptible crops are commonly grown.—Univ. of Calif.

358. ANON.  
**Black spot of the grape vine.**  
*Agric. Gaz. N.S.W.*, 1950, 61: 367-8, illus.

Recommendations for control are, in winter, to burn prunings and remove and burn loose bark, in spring and summer to spray with bordeaux mixture.

### Nematodes.

(See also 431b.)

359. BLACKMON, G. H., AND OTHERS.  
**Variety tests of minor fruits and ornamentals.**  
*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 89-90.

Variety tests of minor fruits are mentioned, but the main item of interest concerns two experiments on the control of nematodes in mulched and unmulched Jewel peach trees. Three fumigants improved growth as measured by cross-sectional area of the trunk, but whereas chloropicrin was the best treatment without mulch, ethylene dibromide and D-D gave better results with mulch. The average growth of mulched trees was better than that of unmulched.

### Mite and insect pests.

(See also 163, 431a, e, l, n, r, 905, 1194, 1227, 1232, 1233.)

360. RUSSO, G.  
**La difesa delle coltivazioni e dei prodotti ortofrutticoli. (The protection of horticultural products.)**  
*Ital. agric.*, 1950, 87: 545-57, illus.

An account of horticultural insect pests in Italy, with many clear photographs showing the damage they cause.

361. OTAMENDI, J.-C.  
**Las hormigas podadoras. Formas de combatir las. (Control of leaf-eating ants.)**  
*Idia*, 1949, 2: 22: 8-12, illus.

The author points out the need for a national campaign to control leaf-eating ants in the Argentine. They are causing widespread and serious damage, and the different habits of the numerous species involved make control difficult. At present growers have not the knowledge or equipment to deal with the problem adequately. He records the main centres of distribution of the more important species of *Atta* and *Acromyrmex*, and describes methods of control by carbon bisulphide fumigation, using the J.P. borer and J.P. injection bellows or the Brazilian vaporizing pump "Agridesfa".

362. LITTLE, V. A.  
**Methyl bromide controls the Texas leaf-cutting ant.**  
*Down to Earth*, 1950, 6: 1: 15, illus.

The Texas leaf-cutting ant, *Atta texana*, may cause serious damage to nurseries, orchards, vegetables, cereals, forage crops, and pine seedlings in the southern states of the U.S. Methyl bromide injected into the ant colonies at the rate of 1 lb. per ordinary size colony seems to provide an effective control.

363. HARRIS, W. B.  
**Control of green peach aphid.**  
*J. Dep. Agric. S. Aust.*, 1950, 53: 443-5, illus.

Spring treatment trials, using DDT (emulsion), HETP, and E605, resulted in very good control of a severe aphid infestation, although DDT in wettable powder form failed to control the aphid (*Myzus persicae*).

364. LAMBERS, D. H. R.  
**De nederlandse bladluizen van framboos en braam. (The Rubus-aphids in the Netherlands.)** [English summary 4 lines.]  
*Tijdschr. Plziekt.*, 1950, 56: 253-61, bibl. 2, illus.

An account of raspberry and blackberry aphids particularly in relation to their transmission of virus diseases. Six species are described and four of them illustrated with drawings.

365. DIVISION OF FRUIT INSECT INVESTIGATIONS.  
**Control of apple tree borers.**  
*Leaflet. U.S. Dep. Agric.* 274, 1950, pp. 6, illus.

Notes on the flatheaded apple tree borer (*Chrysothrips femorata*), the roundheaded apple tree borer



(*Saperda candida*), and the shot hole borer (*Scolytus rugulosus*) and their control.

366. SHAW, F. R., BAILEY, J. S., AND WHEELER, E. H.

The blueberry flea beetle.

*J. econ. Ent.*, 1950, 43: 387, bibl. 2.

Results of tests in Massachusetts indicate that while DDT, parathion and tetraethyl pyrophosphate were all toxic to the blueberry flea beetle, *Altica sylvia*, DDT was preferable as regards cost and residual effect.

367. ROSELLA, E.

Les possibilités actuelles de lutte contre le capnodis. (The present day control of capnodis.)

*Progr. agric. vitic.*, 1950, 134: 214-17, bibl. 3.

Trials in Morocco are mentioned in which spraying the trunks of fruit trees to a height of 18 to 20 cm. with HCH preparations gave good results against the wood-boring beetle, *Capnodis tenebrionis*.

368. SCHNEIDER, F.

Vergleichende Bekämpfungsversuche gegen Maikäfer (*Melolontha vulgaris*) mit Hexa und DDT in Alpnach (Obwalden). (Swiss trials on the control of cockchafer with BHC and DDT.)

*Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 397-405, 425-31, bibl. 6, illus., being *Ber. Zentr. Maikäferbekämpf.* 10.

In two-year trials, in the course of which forest margins in different areas were treated with mist blowers, BHC (8%  $\gamma$ -isomer, at 7.5%) had a much greater knock-out effect on cockchafers than DDT emulsion (20% DDT at 10% or 50% DDT at 5%). Some dropped beetles recovered after both treatments, but to a much larger extent after applications of DDT. A sub-lethal dosage of the latter insecticide had an activating effect causing mass flight of the beetles and their settling elsewhere, e.g. in orchards. Under certain conditions applications from a helicopter appear to be necessary to control the pest effectively, but attention is drawn to the danger of destroying the useful insect fauna at the same time. The experiments were carried out by Wädenswil Research Station.

369. WIESMANN, R., AND GASSER, R.

Fünf Jahre Erfahrungen in der Bekämpfung des Maikäfers (*Melolontha melolontha* L.) und Beobachtungen zu seiner Ökologie. (Five years' trials on cockchafer control and observations on its ecology.)

Reprinted from *Z. Pflkrankh.*, 1950, 57: 17-37, bibl. 56, illus.

Good control of cockchafers was achieved on fruit trees in Switzerland with DDT dust or spray. Through treatment of forest edges with rain-resistant Gesarol emulsion it was possible to improve the protection of cultivated areas. The applications were carried out from aeroplanes in 1948 and 1949, and the economic aspect of the process and the types of plane are discussed. Success depends on the correct timing of the application with regard to the development of the leaves of the forest trees, the stage of maturity of the  $\phi$  cockchafers and also favourable weather. The influence of the treatment on bees, birds and forest- and water-fauna are considered.

370. WIESMANN, R., GASSER, R., AND GROB, H. Versuch zur Bekämpfung des Maikäfers (*Melolontha melolontha* L.) durch Flugzeugbehandlung mit DDT-Stäubemittel. (Cockchafer control by aeroplane with DDT dust.)

Reprinted from *Mitt. schweiz. ent. Ges.*, 1950, 23: 1-36, bibl. 10, illus.

Results of trials with 5% DDT dust applied from an aeroplane on 40 ha. of forest edge in Switzerland in 1948 are given. [See also abstract 369 above.]

371. BÖHM, H.

Beobachtungen über das Auftreten des rauhhaarigen Rosenkäfers als Schädling von Obstbaumblüten in Österreich. (Incidence of *Tropinota hirta* as a pest of fruit tree blossoms in Austria.) [English summary 14 lines.]

*PflSch. Ber. Wien*, 1950, 5: 241-57, bibl. 12, illus.

Since 1946 the beetle *Tropinota* (*Epicometis*) *hirta* has caused severe injury to fruit tree blossoms in several parts of Austria by feeding on the stamens and pistils, and in the case of apple and pear on other parts of the flower as well. All attempts to control the pest chemically having failed so far, repeated collection of the beetle is recommended for the present, preferably in the late morning and early afternoon.—Bundesanst. f. Pflanzenschutz, Vienna.

372. YOUNG, H. C., AND OTHERS.

White-fringed beetles and how to combat them.

*Circ. U.S. Dep. Agric.* 850, 1950, pp. 15, illus.

The larvae and adults of the white-fringed beetles (*Graphognathus* spp.) have been observed to feed on 385 species of plants. In the field the adults feed on more than 170 species of plants, including field, garden, and truck crops, weeds, ornamental shrubs and flowers, wild bushes, vines, and trees. An account is given of the stages, life history, seasonal history, nature of injury, natural enemies, and control by cultural methods and by spraying or dusting with cryolite or DDT.

373. SAVARY, A.

La lutte contre les forficules ou "perce-oreilles". (Earwig control.)

*Rev. romande Agric. Vitic.*, 1950, 6: 66-8, illus.

Of the chemicals tested in the laboratory against earwigs (*Forficula auricularia*) on pears, parathion, chlordane, BHC and DDT proved satisfactory, while rotenone and systemic insecticides respectively acted too slowly or were quite ineffective. Traps and baits for earwig control in vegetables and flowers are also discussed.—Lausanne horticultural research station.

374. ANON.

The fruit fly problem tackled on a community basis.

*Fruit World, Melbourne*, 1950, 51: 9: 43.

A compulsory scheme aimed at the eradication of the Mediterranean fruit fly has been introduced in Western Australia in an area of about 50 square miles, where over 100,000 fruit trees of susceptible varieties are

concentrated in commercial orchards and private gardens. A sodium fluosilicate-sugar bait is being applied once a week by a specially designed mobile power sprayer to all fruit trees throughout the district for 6 weeks before the fruit matures and for 2 weeks after harvest. The results obtained so far are very encouraging.

375. COUTANCEAU, M.

La mouche des fruits dans la région parisienne. (The Mediterranean fruit fly in the Paris region.)

Rev. hort. Paris, 1950, 122: 43-5, bibl. 2, illus.

While apricots, peaches and early pome fruit varieties are attacked only lightly by the Mediterranean fruit fly in the Paris region, losses in late varieties, for instance in the pear variety Compessee de Paris, amounted to 50% in 1949. Possible causes of the exceptionally severe infestation in that year are discussed and the following control measures are suggested: (1) Burial of all waste fruits at a depth of 75 cm.; (2) removing carefully all early fruits that are attacked; (3) bagging the more valuable dessert fruits; and (4) three weeks' storage of fruit at 0.5-4.4° C. to check the development of eggs and larvae.

376. COSTANTINO, G.

Un système original pour l'emploi des cuvettes-pièges dans la lutte contre la mouche de l'olive (*Dacus oleae*, Gmel.). (A new method of trapping the olive fly.) *Fruits et Prim.*, 1950, 20: 241-4, bibl. 24, illus.

Prior to making large-scale experiments with synthetic insecticides on the control of the olive fly in Calabria, Italy, bowls containing 3 l. of 5% diammonium hydrogen phosphate solution were placed in the tops of the trees in order to estimate the degree of infestation by counting the trapped insects. Much labour was saved by moving the bowls up and down by means of pulleys.

377. NIZI, G.

Le pupe di *Dacus oleae* Rossi e le temperatura. (The effect of temperature on the nymphs of *Dacus oleae*.)

*Olearia*, 1950, 4: 299-309, bibl. 31, from abstr. in *Oléagineux*, 1950, 5: 683.

A study of the behaviour of olive fly nymphs at various temperatures in the province of Pérouse is reported. The effect of some insecticides on the nymphs was also determined.

378. BACHMANN, F.

Untersuchungen über die Gallmücke *Thomasiniana theobaldi* Barnes an Himbeer-ruten. (Investigations on the raspberry cane midge.)

Schweiz. Z. Obst- u. Weinb., 1950, 59: 386-92, illus.

In an earlier paper [see H.A., 19: 2000] it had been suggested that the raspberry cane midge, *Thomasiniana theobaldi*, is the primary cause of spur blight, *Didymella applanata*. Discussing the biology and distribution of the midge the author states that the pest is not new to Switzerland as had been thought previously.

While parasitism of the midge can be high, it is of no economic importance; neither is the chemical control of the larvae on the canes. Results of laboratory and field experiments to prevent the emergence of the midges from the soil showed, however, great promise. Through a single, thorough application of 2-3 decilitres of hexa- or chlordane-emulsion in 150-200 litres of water per are, good control was achieved when no soil cultivation took place for 4 weeks after the treatment and no other infested plantings were within 200-500 m. This treatment was found also to be effective against cockchafers.

379. CHAPMAN, P. J., AND LIENK, S. E.

Orchard mite control experiments in western New York.

J. econ. Ent., 1950, 43: 309-14, bibl. 3, being J. Pap. N.Y. St. agric. Exp. Stat. 818.

The 2 species of mites of economic importance are the European red mite, *Paratetranychus pilosus* and the two-spotted spider mite, *Tetranychus bimaculatus*. The winter eggs of the European red mite were effectively controlled with a 2% petroleum oil spray applied in the delayed dormant bud stage, and with dormant application of dinitro secondary butyl phenol and dinitro amyl phenol preparations at 0.5% strength. The materials tested to determine their acaricidal value against summer infestations of mite included 7 organic phosphorous compounds, 2 dinitrophenols and 3 chlorinated products. Parathion at a 4-oz. dosage provided good residual action against European red mite, the more easily controlled of the two. A product containing ethyl p-nitrophenyl thionobenzenephosphonate gave similar results.

380. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Grape vine mites.

Agric. Gaz. N.S.W., 1950, 61: 369-71, illus.

Three mites are briefly described, viz. the vine-leaf blister mite (*Eriophyes vitis*), vine-berry or bunch mite (*Tenuipalpus californicus*) and the grape rust mite (*Calepitrimerus vitis*). For control, lime-sulphur is recommended at the rate of 1 gal. of the concentrate to 10 gal. water.

381. SYLVÉN, E.

Larvplågan på Ven. (The caterpillar plague in the Ven district, Sweden.)

Växtskyddsnotiser, 1950, No. 3, pp. 33-5, illus.

Foremost among the caterpillars that completely defoliated the fruit trees in the Ven district in spring, 1950, was the moth *Euproctis phaeorrhoea*. The biology of this apple pest is briefly discussed.

382. REICH, H.

Die Obstbaum-Miniermotte. (The apple leaf miner.)

Mitt. ObstbVersuchsring Jork, 1950, No. 19/20, pp. 112-15, bibl. 3, illus.

The apple leaf miner, *Lyonetia clerkella*, and its life history are briefly described. Generally a thorough winter wash with 4% dinitroresol carbolineum gives sufficient control; when required, summer spraying with E605 can be effective.



## 383. TURICA, A.

Investigaciones sobre *Carpocapsa pomonella* L. y servicio de alarma en el Delta. (Investigations concerning *Carpocapsa pomonella* L. and the codling-warning service in the Delta region [Argentina].)

*Idia*, 1950, 3: 31: 23-7, illus.

Codling moth is responsible for about 60% of the insect damage caused to apples in the Delta area near Buenos Aires. Observations on the biological cycle and habits of the moth in this area are recorded. Good control was obtained by either 4 sprays of 50% DDT or 2 sprays of lead arsenate followed by 2 of DDT. The organization of the new codling-warning service is described.

## 384. (ASTELARRA, L., AND OTHERS.)

Servicio de alarma para el Alto Valle del Río Negro. (The codling-warning service in the upper valley of the Río Negro [Argentina].)

*Idia*, 1950, 3: 28/29: 25-30, illus.

In this paper presented to the National Conference of Plant Protection, held in Buenos Aires in April, 1950, the organization of the codling-warning service of the Cinco Saltos Experimental Station is described. By means of traps distributed systematically throughout this important apple and pear growing area, the date of emergence of each generation of codling is observed, and growers are notified so that they may time their sprays accordingly. It has been found that there are 4 generations of codling in this district, the last of which is of little economic importance. Data are given on the development of each generation. Six lead arsenate or DDT sprays are recommended for control.

## 385. MICHELBAKER, A. E., MIDDLEKAUFF, W. W., AND DAVIS, D.

Environmental resistance as a factor in codling moth control on walnuts.

*J. econ. Ent.*, 1950, 43: 383.

Evidence was obtained in California indicating that climatic and biotic factors were important in influencing the size of codling moth population. It appeared that when these factors encourage a high environmental resistance control is comparatively easy, but that when they favour the pest, correct timing and thorough applications are essential to achieve satisfactory results. Parasitism increased with high populations.

## 386. WASSERBURGER, H.-J.

Beobachtungen über die Biologie und die Bekämpfung der Johannisbeermotte (*Incurvaria capitella* Cl.). (Observations on the biology and control of the currant shoot borer (*I. capitella*).)

*Nachr.Bl. dtsh. PflSchDienst*, Berlin, 1950, 4: 176-8, bibl. 2.

The winter treatment of the infested red currant plantations with mineral oils (see *H.A.*, 19: 2010) was followed by dusting with Gesarol in May against the moths. It was difficult to assess how much of the reduction in the sudden outbreak of the pest was due to these control measures, but it is estimated that the lethal effect of the winter and spring applications amounted to 60-65%. In March, 1950, Certoxan and

Gesapon gave satisfactory results against hatching caterpillars. The biology of *Incurvaria capitella* and the damage it causes—similar to frost injury—are discussed.

## 387. SNAPP, O. I.

DDT and some of the newer insecticides for control of peach tree borers.

*J. econ. Ent.*, 1950, 43: 315-18, bibl. 1.

In experiments conducted in Georgia from 1945 to 1949, DDT, BHC, chlordane, toxaphene, hexaethyl tetraphosphate, parathion and ryania sprays were used. DDT and BHC were also tested in other forms of application, and additional tests were made with some commercial emulsions. BHC (6%  $\gamma$ -isomer) or DDT (50%), at 8 lb. per 100 gal. of spray, applied to the trunk and lower part of large limbs of peach trees during the oviposition period of peach tree borer moths, *Saminoidea exitiosa*, gave effective control. They were also effective as fumigant treatments. None of the materials used caused injury to the trees or crop.

## 388. NICKELS, C. B., PIERCE, W. C., AND PINKNEY, C. C.

Parasites of the pecan nut casebearer in Texas.

*Tech. Bull. U.S. Dep. Agric.* 1011, 1950, pp. 21, illus.

Twenty-six species of primary parasites were reared from the pecan nut casebearer (*Acrobasis caryae* Grote) in Texas in 1929-34. Their biology was studied and an effort made to rear the more useful ones in large numbers. Five species of secondary parasites were reared in 1930-32.

## 389. LOEWEL, —.

Schäden durch Apfelmarkschabe. (Pith moth damage in apples.)

*Mitt. ObstbVersuchsring Jork*, 1950, No. 17/18, p. 99.

In the Altenland, Germany, incidence of the pith moth species *Blastodacna putripennella* has increased lately. Destruction of the caterpillars in the buds by an application of carbolineum containing at least 10% of a medium oil is recommended, the treatment to be carried out towards the end of the winter. Emulsified carbolineums were found to be less effective.

## 390. FISCHER, H.

Zur Biologie und Bekämpfung des Pflaumenwicklers (*Laspeyresia funebrana* Tr.) in Norddeutschland. (The biology and control of *Cydia funebrana* in North Germany.)

*Anz. Schädlingsk.*, 1948, 21: 3: 40-3, bibl. 2, from abstr. in *Rev. appl. Ent.*, 1950, 38: 347.

*Cydia funebrana* (red plum maggot) has become an important pest of plums in northern Germany of recent years; it has increased in the plum-growing area of Schleswig-Holstein since 1937-38 and caused losses that frequently amounted to 95% of the crop in 1945-48. Experiments on control were directed chiefly against the second-generation larvae, sprays being applied on 25 July and 4 August in 1947. The percentages of infested fruits were 26 for a spray of 1.5% nicotine with soap, 41 for a proprietary nicotine preparation,

32 for 2% Gesarol, 24 for 0.1% Bladan [hexaethyl tetraphosphate] and 14 and 7 for 0.01 and 0.02% E605 [parathion with 30% emulsifier] as compared with 81 for no treatment.

391. BREIDER, H.  
Morphologische Resistenzmerkmale der Rebenblätter. (Morphological indicators of phylloxera resistance in vine leaves.)  
*Züchter*, 1950, 20: 210-12.

In vine breeding it is of great importance to be able to diagnose phylloxera resistance from morphological characters. Schilder (*H.A.*, 19: 1981) and Müller (*H.A.*, 20: 742) have, in the author's view, not shaken the contention that a close relationship exists between leaf resistance and both hairiness and compact structure of the leaf. Experimental evidence is quoted in support of this hypothesis.

392. MASSEE, A. M.  
*Hoplocampa brevis* (Klug) (Hym., Tenthredinidae) recorded from Kent.  
*Ent. mon. Mag.*, 1950, 86 (fourth series—11): 224.

A brief note about a serious infestation of pear sawfly, *Hoplocampa brevis*, on a fruit farm in Kent in May, 1949, and a repetition of it in April, 1950. [See also *H.A.*, 20: 2539.]

393. DETROUX, L., AND GEEROMS, A.  
Essais de lutte contre la tenthrede limace (*Eriocampoides limacina* Retz.) au moyen des insecticides organiques de synthèse. (The control of the pear slugworm by synthetic insecticides.)  
*Rev. Agric. Brux.*, 1950, 3: 604-7.

Trials carried out in 1948 and 1949 at the experimental orchards of Gembloux and Steenhuffel, Belgium, showed that the pear slugworm, *Eriocampoides* [*Caliroa*] *limacina*, is satisfactorily controlled by the new synthetic insecticides, with the exception of parathion. Rotenone and HETP are recommended for pre-harvest applications, whereas DDT, BHC, toxaphene and chlordane are preferable for a post-harvest treatment because of their residual action. The pest occurs on pears, cherries and plums. Tabulated data of the tests are presented.

394. CHANDLER, S. C.  
Forbes scale as a major pest of peach.  
*J. econ. Ent.*, 1950, 43: 398.

Since the inclusion of DDT in the spray schedule, the Forbes scale, *Aspidiotus forbesi*, has increased markedly on peaches in Illinois.

395. ENSER, K.  
Histologische Untersuchungen über den Saugstich von *Aspidiotus perniciosus* Comst. (San José-Schildlaus). (Histological investigations on the feeding of the San José scale.) [English summary 3 p.]  
*PflSch. Ber. Wien*, 1950, 5: 204-26, bibl. 24, illus.

The histological study of shoots of fruit trees, currants, nuts and shrubs showed that the symptoms of San José scale injury are caused primarily by disturbances in the cell division of the cambium. The findings are illustrated by 12 drawings and photographs.

### Other pests.

396. MANSFELD, K.  
Beiträge zur Erforschung der wissenschaftlichen Grundlagen der Sperlingsbekämpfung. (The scientific basis of sparrow control.)  
*NachrBl. dtsh. PflSchDienst, Berlin*, 1950, 4: 131-6, 147-54, 164-75, bibl. 33.

Although the problem is considered chiefly from the agricultural point of view, it is pointed out that the house sparrow may become a serious pest of fruit and vegetables. To encourage some of the more valuable smaller birds for insect control in orchards, it may also be necessary to control the tree sparrow [*Passer montanus*].

397. SWITHINBANK, D. J.  
Tits and wasps.

*Fruit Year Book*, 1950, pp. 115-16, illus.

It is not always fair to accuse tits of making the breach through which wasps attack. The types of damage caused by these 2 pests on apples and pears are distinguished.

### Antibiotics.

(See also 431g, 1220.)

398. HERRELL, W. E.  
Newer antibiotics.  
*Annu. Rev. Microbiol.*, 1950, 4: 101-28, bibl. 235.

The newer antibiotics, for the purpose of this review, include those which have been introduced and investigated since the introduction of penicillin and streptomycin.

399. WEINDLING, R., KÄTZNELSON, H., AND BEALE, H. P.  
Antibiosis in relation to plant diseases.  
*Annu. Rev. Microbiol.*, 1950, 4: 247-60, bibl. 108.

A review dealing with pathogens affected by antibiotic micro-organisms, control of plant diseases by exploiting antibiosis, antibiotic substances in relation to plant diseases and antibiosis in relation to virus diseases. No antibiotic has yet been found capable of controlling a plant virus disease.

400. ANON.  
Antibiotics.  
*Manuf. Chem.*, 1950, 21: 394-6, bibl. 14.

This review of the recent literature on antibiotics includes a discussion of terramycin from *Streptomyces rimosus*, of streptomycins from *S. griseus*, of grifolin from *Grifola confluens* and of antibiotic-producing substances in the soil. [Some of the papers, on which the review is based, have already been abstracted or noted.]

401. MARQUES MESA, A., AND OTHERS.  
Investigación de actividades antibióticas en extractos de plantas superiores. (The antibiotic activity of extracts of higher plants.)  
*Cien. y. Invest.*, 1950, 6: 471-6, bibl. 12.

Acetone, alcohol and water extracts of a large number of Mexican plants that have been used for medicinal



purposes, chiefly by the native population, were tested for antibiotic activity against *Staphylococcus aureus*, *Salmonella pullorum* and *Xanthomonas phaseoli*. The results are tabulated. Of 68 genera tested against the first 2 bacteria, 27 proved active, and of 20 genera tested against *Xanthomonas phaseoli*, 8 proved active.—National Institute of Nutrition, Mexico.

402. MIESCHER, G.

Über die Wirkungsweise von Patulin auf höhere Pflanzen, insbesondere auf *Solanum lycopersicum* L. (The action of patulin on higher plants, particularly on tomato.) *Phytopath. Z.*, 1950, 16: 369-97, bibl. 23, illus.

Patulin (clavatin), an antibiotic obtained from various fungi (e.g. *Penicillium*, *Aspergillus*), is a very potent plasma-poison. Its lethal effect on tomato leaves and on the stamens of *Tradescantia virginica* is described in detail.

### Fungicides.

(See also 146, 176, 300m, 1230, 1233.)

403. FUNGICIDE COMMITTEE, AMERICAN PHYTO-PATHOLOGICAL SOCIETY.

Nation-wide results with fungicides in 1949: Fifth Annual Report.

*Plant Dis. Repr.*, 1950, Suppl. 192, pp. 121-87.

This is the 1949 summary of results with fungicides, compiled from reports received from 196 co-operators; it includes results with 215 different materials on 55 different crops.

404. MARSH, R. W.

New sprays against plant diseases.

*Grower*, 1950, 34: 463-7.

The use of new materials for disease control on fruit and vegetables is outlined, mention being made of the thiocarbamates, mercurials, quinone derivatives, nitrogen-ring compounds, chlornitrobenzenes, antibiotics and systemic fungicides. The chemical names of the active ingredients of 23 fungicides are given in an appendix.

405. BURCHFIELD, H. P., AND MCNEW, G. L.

Mechanism of particle size effects of fungicides on plant protection.

*Contr. Boyce Thompson Inst.*, 1950, 16: 131-61, bibl. 21, illus.

The amount of Phygon (2,3-dichloro-1,4-naphthoquinone) required to control tomato early blight, *Alternaria solani*, is inversely proportional to the logarithm of the number of particles into which it is subdivided. Various mechanisms which can be used to explain the particle size effect are discussed in detail. [From authors' summary.]—Boyce Thompson Inst. for Plant Res.

406. MCNEW, G. L., AND BURCHFIELD, H. P.

Particle size in relation to the fungitoxicity of dichloronaphthoquinone.

*Contr. Boyce Thompson Inst.*, 1950, 16: 163-76, bibl. 13, illus.

Dichloronaphthoquinone formulated in special all-purpose garden dusts with insecticides and sulphur

was more effective than the pure chemical in preventing the late blight of tomatoes and potatoes caused by *Phytophthora infestans* under field conditions and the early blight of tomatoes caused by *Alternaria solani* in greenhouse experiments. An important contributing factor towards this increased effectiveness was that the particles in the special formulations were smaller than in the parent material (Phygon).

407. WENZL, H.

Steigerung der fungiziden Wirksamkeit von Winterspritzmitteln im Frostspritzverfahren. (Spraying in frosty weather increases the action of fungicides.) [English summary 14 lines.]

*PflSch. Ber. Wien*, 1950, 4: 110-16, bibl. 20.

Earlier experiments have shown that spraying in frosty weather increases the ovicidal action of winter washes (see H.A., 19: 1104 and 2964). In further trials it was found that the fungicidal effect of a DNC preparation and of a heavy oil-carbolineum is very markedly enhanced by applications at temperatures below 0° C., the test objects being apricot and plum fruits mummified by *Monilinia laxa* infection. The explanation is again that the freezing of the spray prevents run-off so that larger amounts of the active substance are present on thawing.—Bundesanst. f. Pflanzenschutz, Vienna.

408. PALMITER, D. H.

Apple fungicides and their effects on yield and quality in New York.

*Proc. Vt. St. hort. Soc.*, 1950, 54: 19-21.

In a McIntosh orchard, observed for 7 years, trees sprayed with Ferbam (Fermate) showed a considerable increase in yield over trees which received sulphur sprays without N, and a still greater increase over sulphur plots that received N in the form of Uramon. Further tests with some of the newer fungicides like Phygon, Crag 341 and Tag 331 also show good promise and superiority over sulphur in scab control and yield returns. Research experience indicates that a combination of several fungicides used together or in an alternating schedule may be the best answer to scab control.

409. SWARTWOUT, H. G.

DN-111 toxic to sooty blotch.

*Down to Earth*, 1950, 6: 1: 2, illus.

In the course of a study of the phytotoxicity of a number of insecticide combinations on apples in 1949 it was found that a combination in which sulphur at 2-100 and DN-111 (20% dinitro-o-cyclohexylphenol dicyclohexylamine salt) at 1-100 were used was effective in checking the development of sooty blotch.—Missouri agric. Exp. Stat., Columbia.

410. THURSTON, H. W., Jr.

Use of glyoxalidine derivatives as fruit fungicides.

*Agric. Chemls*, 1950, 5: 9: 28-31, 99, bibl. 8.

The work on the control of apple scab and cherry leaf-spot by glyoxalidine derivatives is reviewed and the data so far obtained are presented in 8 tables. From these preliminary results it is confidently predicted that the new group of fungicides will prove a valuable tool in the fruit-grower's hands.

## 411. DESFLASSIEUX, A.

Traitement simultané du mildiou et de l'oidium par le complexe verdet-permanganate—formule D.X. (The simultaneous treatment of downy and powdery mildews on vine by a verdigris-permanganate spray mixture—formula D.X.)

*Bull. Soc. cent. Agric. Aude*, 1949, 130: 340: 317-22.

CH[OUAR]D, P.

Le complexe verdet-permanganate. (A verdigris-permanganate spray mixture.)

*Rev. hort. Paris*, 1950, 122: 84-5.

The experiments carried out by A. Desflassieux in the Department de l'Aude, France, are reported fully in the first article and briefly in the second. A spray programme for vines consisting of 5 or 6 applications of a mixture of neutral copper acetate and permanganate not only controlled downy mildew and oidium but also had a markedly invigorating effect on the plants. The spray is prepared as follows: to 1 kg. verdigris dissolved in 90 l. water is added a solution of 0.125 kg. permanganate in 10 l. water. The mixture must be used on the same day that it is prepared. Peach trees treated with the verdigris-permanganate mixture in October did not drop their leaves until mid-November, and the wood developed a pink colour instead of the dull grey symptomatic of oidium infection.

## Insecticides.

(See also 146, 171, 177, 407, 431m, o, p, 1232, 1233.)

## 412. BERAN, F.

Die Wirkung von Dinitro-ortho-Kresol-Mineralölkombinationen im Frostspritzverfahren. (The effect of spraying a DNC-mineral oil mixture in frosty weather.) [English summary 10 lines.]

*PflSch. Ber. Wien*, 1950, 5: 227-32, bibl. 5.

In the winter of 1949/50 the experiments on spraying in frosty weather (see *H.A.*, 19: 1104 and 19: 2964) were carried out with a mixture of DNC and mineral oils. The results showed that at temperatures below 0° C. this mixture was effective against San José scale at half the normal concentration. None of the buds of the 300 fruit trees treated appeared to be injured and no difficulties in spraying were experienced, except at a temperature of -6° to -10° C. in one avoidable case, where hose connexions and valves froze.

## 413. DAVID, W. A. L., AND GARDINER, B. O. C.

Factors influencing the action of dust insecticides.

*Bull. ent. Res.*, 1950, 41: 1-61, bibl. 66.

The test insects were four species of beetle of the genera *Tribolium*, *Calandra*, *Rhizopertha* and *Ptinus*. The factors examined were specific gravity, bulk density, particle size, particle shape, specific surface, hardness, moisture relations, and electrical properties.—A.R.C. Unit of Insect Physiology, Cambridge.

## 414. GEISLER, E.

Einige Beobachtungen über den Einfluss des Hexachlorcyclohexans auf die Pflanze. (Observations on the effect of benzene hexachloride on plants.)

*NachrBl. dtsh. PflSch Dienst.*, Braunschweig, 1950, 2: 131-5.

(1) An overdose of BHC has a growth-inhibiting effect, longitudinal growth being more affected than the synthesis of matter. The latter may be stimulated by a dosage which inhibits the former, and longitudinal growth is stimulated by a further dilution. (2) Germination itself remains unaffected; the inhibiting action sets in when the radicle has developed and the seedling begins to take up water and nutrients. (3) The degree of inhibition is specific for the individual plant genera examined, but usually the plants inhibited in their early stages catch up later on. (4) Many observations suggest the hypothesis that BHC influences the activation or conduction of hormones in the plant. The Moewus test (see *H.A.*, 19: 1722 and 2674) showed a higher growth substance content in stems in which growth had been inhibited. (5) Tests with *Drosophila* showed the systemic action of BHC, as plants grown on BHC-containing soil became insecticidal. Within limits still to be defined the degree of toxicity depends, among other factors, on the concentration of the insecticide in the soil. (6) It is confirmed that the  $\gamma$ -isomer has a stronger action than the  $\alpha$ -,  $\beta$ -, and  $\delta$ -isomers, and this remains true after passage through the plant. (7) The  $\gamma$ -isomer causes the most pronounced growth inhibition, while the inhibiting action of " $\alpha$ " and " $\beta$ " is slight. The  $\delta$ -isomer has a considerably stronger inhibiting action than " $\alpha$ " and " $\beta$ " but is no more insecticidal than these. Thus, there is no linkage between growth inhibiting and insecticidal action. (8) The application of impure BHC preparations may cause growth inhibition at normal dosages because of the high  $\delta$ -content. Preparations containing almost 100% " $\gamma$ " as the active agent, however, have a stimulating influence on growth as they permit the dosage to be reduced. (9) If a combination of isomers is desired to reduce the vapour tension, " $\alpha$ " or " $\beta$ " and " $\gamma$ " should be used. [Translation of author's summary.]—Pflanzenschutzamt, Frankfurt/Main.

## 415. LHOSTE, J.

Chlordane et composés analogues. (New organic insecticides: chlordane and its analogous compounds.)

*Rev. hort. Paris*, 1950, 122: 48-51, bibl. 9.

The results of field and laboratory trials with chlordane and compounds "497" and "118" are reviewed, the test insects being mainly fruit pests.

## 416. TITTLE, E. A.

Le BHC, rival du DDT. (Benzene hexachloride, a rival of DDT.)

*Rev. d'Oka*, 1949, 23: 199-244, bibl. 116.

A review of the nature, uses, methods of application and dangers of benzene hexachloride.

## 417. POWNING, R. F.

The compatibility of DDT with nicotine and alkaline diluents in agricultural dusts.

*Aust. J. agric. Res.*, 1950, 1: 178-81, bibl. 4.

An alkaline diluent such as calcium hydroxide is generally used in nicotine aphicidal formulations; however, when DDT is mixed with these dusts for added larvicidal effect, it is decomposed rapidly. Experiments show that this decomposition is directly due to the alkaline nature of the diluent and only to a small extent to the effect of the nicotine. A combined dust consisting of DDT and nicotine in pyrophyllite,



calcium carbonate, or magnesium carbonate is sufficiently stable for use against cabbage insects and may be stored safely for at least two months. [Author's summary.]-C.S.I.R.O.

418. BYRKIT, G. D., AND MICHAŁEK, G. A.  
**Hydrazine in organic chemistry.**  
*Industr. Engng Chem.*, 1950, 42: 1862-75,  
bibl. 384.

The discussion includes the use of semicarbazones and thiosemicarbazones as insecticides, with references to the relevant literature.

419. MALLO, R. G.  
**Derivados de esteres fosforicos. (Phosphoric ester derivatives.)**  
*Idia*, 1949, 2: 20: 7-14, bibl. 63.

Mainly concerned with parathion. The properties and uses of this insecticide-acaricide are dealt with, its phytotoxicity, residual action, mode of action and toxicity to man. The methods and strength of application authorized by the U.S. Department of Agriculture are recorded, and a list given of the insects against which parathion has proved effective.

### *Spraying methods and apparatus.*

(See also 1226, 1232.)

420. GROVES, K., JOHNSON, W. H., AND WALKER, K. C.  
**Uniformity of spray material distribution by stationary orchard spray systems.**  
*Bull. Wash. St. agric. Exp. Stat.* 515,  
1950, pp. 22, bibl. 6.

Samples of spray mixtures collected at different points in spray systems varied in concentration by an average of less than 10%. A photometric apparatus, which could be inserted anywhere in the pipe system, was devised to measure continuously the concentrations of spray mixtures flowing through it. It was found that lead arsenate mixtures were carried through the pipe lines with satisfactory uniformity under normal operating conditions. Lead arsenate that settled during a shutdown of a few minutes was picked up rapidly at rates of flow of 3 or more gallons per minute. Laboratory experiments have shown that flow rates of 2.2, 3.2 and 4.2 gal. per min. in  $\frac{3}{4}$ -, 1-, and  $1\frac{1}{2}$ -in. pipes, respectively, were required to keep lead arsenate in suspension. Rates of flow somewhat in excess of these minimum rates are required to achieve rapid pickup of the settled material.

421. KHAN, M. H.  
**Spraying and dusting equipment for orchards.**  
*Punjab Fruit J.*, 1950, 14: 24-8, illus.

The main types of the usual equipment for spraying and dusting orchards are briefly described. The use of aircraft is given rather fuller treatment and the main advantages and disadvantages are set out. C.W.S.H.

422. YEOMANS, A. H.  
**Directions for applying windborne aerosols for insect control out of doors.**  
[Publ.] U.S. Dep. Agric. ET-282, 1950,  
pp. 8, bibl. 8.

Notes on weather requirements, deposition, swath width, particle size, dosage, formulations, and method of applying aerosols. Recommended swath widths

and dosages of DDT for control of insects in the field under good conditions are tabulated.

423. FAULKNER, F. S., DEONIER, C. C., AND DAVIS, A. N.  
**Gravity-flow equipment for dispersing insecticides from aircraft.**  
[Publ.] U.S. Dep. Agric. ET-284, 1950,  
pp. 6, illus.

The gravity-flow unit described consists of a tank in the front cockpit and under-wing venturis to increase the breakup of the sprays. Notes on the effect of air currents on sprays are given.

424. ANGELINI, A., AND OTHERS.  
**Observations faites au cours du traitement aérien d'un verger contre l'hyponomeute. (Observations made during an aerial treatment of an orchard against the ermine moth.)**  
*Parasitica*, 1950, 6: 81-7, bibl. 5.

An account of a trial carried out on 13 June, 1949, in an orchard of cider apples in Normandy. The authors consider that there are two disadvantages in applying dusts from the air: (1) the great irregularity of distribution, (2) the small amount of effectively toxic dust received by the foliage. It was found, however, that it was possible to destroy a considerable number of the caterpillars by applying DDT in the last larval stage before nymphosis.

425. STILL, G. W.  
**Hooded-boom sprayer for grapes.**  
[Publ.] U.S. Dep. Agric. EC-12, 1950,  
pp. 10, illus.

A simple home-made hood attachment to a power sprayer is described with the aid of illustrations. It has proved the most satisfactory equipment for spraying grapes in the eastern U.S.A. The hood is lowered over the row of vines and the spray directed from nozzles on either side. The sprayer should have a pump capacity of 15 gal. or more per minute and be pulled at a speed of about 2 to  $2\frac{1}{2}$  m.p.h.

### *Spray residues and spray injury.*

426. ALLEN, W. R., AND OTHERS.  
**DDT residues on currants and gooseberries.**  
*Sci. Agric.*, 1950, 30: 380-3, bibl. 2, being  
*Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa*, 2685.

Pre-bloom DDT sprays used to control the currant fruit fly, *Epochra canadensis*, in Manitoba do not apparently influence residues at harvest. Residues after 1 or 2 post-blossom sprays of 1.5 lb. of DDT per acre were approximately 3.0 p.p.m. A significant increase approaching the tentative tolerance level of 7.0 p.p.m. was noted when 2 post-blossom applications were made at 2.3 lb. DDT per acre.

427. HARTZELL, A., AND STORRS, E. E.  
**Bioassay of insecticide spray residues in processed food.**  
*Contr. Boyce Thompson Inst.*, 1950, 16:  
47-53, bibl. 5.

Known amounts of spray residues of 10 insecticides were bioassayed at the Boyce Thompson Institute in processed foods (strained beans, and mixtures of

apricots and apples), *Aedes aegypti* mosquito larvae being used to indicate toxicity. In general, the insecticide toxicity was inhibited when the residues were combined with plant material. Strained beans inhibited toxicity in some cases more than the mixture of apricots and apples. Of the insecticides, heptachlor in both foods and methoxychlor and chlordane in beans showed partial destruction in processing.

428. BATCHELDER, C. H., AND BERNDT, O. E.  
Tumbling equipment for recovery of insecticide residues.  
[Publ.] U.S. Dep. Agric. ET-283, 1950, pp. 5, illus.

Equipment is described and illustrated which is designed to aid the removal of insecticide residues from maize plants prior to obtaining samples for analysis.

429. LUDBROOK, W. V.  
DDT spray injury to pears.  
*J. Aust. Inst. agric. Sci.*, 1949, 15: 94-5, bibl. 2, illus.

A case is recorded in which three applications of 0.1% DDT spray resulted in injury at time of harvesting to about 30% of the fruit of Williams' Bon Chrétien and Packham's Triumph pears. Injury was confined to the skin and consisted of slightly depressed rings of brownish russetting. No injury occurred in Granny Smith and Delicious apples similarly sprayed.

430. TILL, M. R.  
E605 injury to Duchess pears.  
*J. Dep. Agric. S. Aust.*, 1950, 53: 542, illus.

A skin blemish of Duchess pears, apparently caused by E605 sprays to control codling moth in an experimental plot at the Berri Experimental Orchard, was superficial, but conspicuous, and detracted from the appearance of the fruit.

### Noted.

431.  
a ARMSTRONG, T.  
A laboratory study on the toxicity of para-chlorophenyl para-chlorobenzenesulfonate to mites.  
*Down to Earth*, 1950, 6: 1: 6-7.  
b BAINES, R. C., AND THORNE, G.  
Olive, a new host for the citrus-root nematode *Tylenchulus semipenetrans*.  
Abstr. in *Phytopathology*, 1950, 40: 963.  
c BARBIER, G.  
La fumure et les maladies de carence des arbres fruitiers. (Mineral deficiency diseases of fruit trees.)  
*Jardins Fr.*, 1950, 4: 98-104, 128-32, bibl. 6, illus.  
The review is largely based on French work.  
d BROUGH, C. R.  
Potash deficiency in apple trees.  
*J. Dep. Agric. Vict.*, 1950, 48: 456-7, illus.  
Notes on symptoms and control.  
e BURGESS, E. D.  
Development of gypsy moth sex-attractant traps.  
*J. econ. Ent.*, 1950, 43: 325-8, bibl. 3, illus.

- f BURRELL, A. B.  
Some facts about concentrate spraying that may help Vermont growers.  
*Proc. Vi St. hort. Soc.*, 1950, 54: 13-18.  
g BURTON, H. S.  
An antibiotic, thermophilin, from *Lenzites thermophila*.  
*Nature*, 1950, 166: 570, bibl. 1.  
h CAMPBELL, L., AND BREAKEY, E. P.  
Control of yellows in the Marshall strawberry.  
Abstr. in *Phytopathology*, 1950, 40: 964.  
i CHESTER, K. S.  
Plant disease losses: their appraisal and interpretation.  
*Plant Dis. Repr.*, 1950, Suppl. 193, pp. 191-362, bibl. 16 pp.  
j DIRECTIE VAN DE LANDBOUW, WAGENINGEN.  
Ziekten en plagen in land- en tuinbouwgewassen en hun bestrijding in 1949. (Diseases and pests of agricultural and horticultural crops, and their control in 1949.)  
*Meded. PLZiekt. Dienst* 117, 1950, pp. 85, illus.  
k FOISTER, C. E.  
International aspects of plant quarantine.  
*Scot. Agric.*, 1950, 30: 111-14, bibl. 1.  
l JANCKE, O.  
Die Kirschblutenmotte. (The cherry blossom moth, *Argyresthia ephippella*.)  
*Flugbl. Bundesanst. Braunschweig K7*, 1950, pp. 4, illus.  
m MARTIN, H.  
The new phosphorus insecticides.  
*Fruit Year Book*, 1950, pp. 89-91.  
n MASSEE, A. M.  
The fruit tree red spider mite and its control.  
*Fruit Year Book*, 1950, pp. 81-3.  
A note for the home gardener.  
o NEWTON, H. C. F.  
Winter washing fruit trees. A short review.  
*Lincoln. agric. J.*, 1950, 2: 83-9.  
p ROARK, R. C.  
A digest of information on toxaphene.  
[Publ.] U.S. Dep. Agric. E-802, 1950, pp. 85, bibl. 334.  
q SOUZA, D. A., AND MACHADO, F. A.  
A ação defloculante de diversas substancias sobre o arseniato de chumbo em suspensão na agua. (The dispersing action of various substances on a suspension of lead arsenate in water.) [English summary  $\frac{1}{2}$  p.]  
*Arq. Inst. biol. S. Paulo*, 1949-50, 19: 49-56, bibl. 3.  
r WIESMANN, R.  
Untersuchungen über die Diapause der Puppe der Kirschfliege *Rhagoletis cerasi* L. (Dipt. Trypetid.). (The diapause of the cherry fly pupa.)  
Reprinted from *Mitt. schweiz. ent. Ges.*, 1950, 23: 207-25, bibl. 14.



- s WILSON, E. E., AND STOUT, G. L.  
Observations on the bud-failure disorder  
in Jordanolo, a new variety of  
almond.  
Abstr. in *Phytopathology*, 1950, 40: 970.

- t WOLFE, H. R., ANTHON, E. W., AND  
JONES, L. S.  
Transmission of western X-disease of peaches  
by the leafhopper, *Colladonus geminatus*  
(Van D.).  
Abstr. in *Phytopathology*, 1950, 40: 971.

## WEEDS AND WEED CONTROL.

*Herbicides.*

(See also 1231.)

432. BLACKMAN, G. E.  
The principles of selective toxicity and the  
action of selective herbicides.  
*Sci. Progr.*, 1950, 38: 637-51, bibl. 53.

Following an introduction the subject is reviewed under the following heads: [spray] retention; penetration; transport; toxicity at cell level; biological responses of resistant and susceptible plants; and mode of action. [See also *H.A.*, 20: 2665.]

433. GREENHAM, C. G., AND COLE, D. J.  
Studies on the determination of dead or  
diseased tissues. I. Investigations on dead  
plant tissues.  
*Aust. J. agric. Res.*, 1950, 1: 103-17,  
bibl. 20.

To diagnose the vitality of portions of poisoned roots of skeleton weed (*Chondrilla juncea* L.) and bindweed (*Convolvulus arvensis* L.) in the field, probe readings of equivalent parallel resistance ( $R_p$ ) and capacitance ( $C_p$ ) were made, and it was found that the lowest point of dead tissues was usually within one-quarter of an inch of the point at which the value of  $R_p$  was minimal. Values of  $C_p$  did not give any indication of the phase angle of the tissue under test, but gave a useful cross check on the location of the minimum for  $R_p$ . Probe readings at 100 kc/s. served to discriminate between living and dead portions of the one root having similar values for  $R_p$  at 1 kc/s. Readings at 100 kc/s. also served to distinguish some abnormally swollen poisoned roots. [Authors' summary.]—C.S.I.R.O.

434. TINGEY, D. C., AND TIMMONS, F. L.  
Control of perennial weeds by cultural  
methods alone and combined with chemical  
treatments.  
*Proc. 12th annu. western Weed Conf.*,  
Denver, Colo, 1950, pp. 72-5.

A summary of 15 reports on experimental results from 10 States. It appears that a combination of chemical and cultural methods would provide the best weed control.

435. TRAVERS, S. J.  
Weed control by good husbandry.  
*Agriculture, Lond.*, 1950, 57: 264-70.

This article is concerned primarily with weeds in agricultural crops—cereals and roots—and their control by rotations, cultivation, the prevention of seed dispersal, and special cleaning methods.

436. SEELY, C. I.  
Soil sterilants for perennial weed control.  
*Proc. 12th annu. western Weed Conf.*,  
Denver, Colo, 1950, pp. 69-71.

Ten soil sterilants are listed with notes on period of sterility caused, rates of application, hazards, and principal weeds against which they are used.

437. STERLING, C. R.  
Use of newer chemicals in the control of  
weeds.  
*Proc. and Abstr. 3rd west. Canad. Weed  
Control Conf.*, Edmonton, 1949, pp. 72-89.

A review is given of work with TCA (trichloroacetate), Chlorosol-A (a sodium salt of  $\alpha$  hydroxy  $\beta$  trichlor ethyl sulphonic acid), IPC (isopropyl N-phenyl carbamate), methoxone-MPC or MCPA and herbicide and insecticide mixtures. Abstracts following the general discussion include 17 dealing with the effects of TCA and/or Chlorosol-A on couch or quack grass, *Agropyron repens*, 4 with their effects on other grasses, 3 with the effects of TCA on crops and 6 with various aspects of herbicides.

438. HOPP, R.  
Recent developments in chemical weed  
control.  
*Proc. Vt St. hort. Soc.*, 1950, 54: 41-5.

A brief review of achievements with 2,4-D in sweet corn, strawberries, raspberries, and asparagus, and with petroleum herbicides in carrots. Work with di-nitro compounds, calcium cyanamide, potassium cyanate, sodium chloride and TCA is also mentioned.

439. TANNER, W. L.  
Phenyl carbamate for killing weed seeds in  
plant bed soils.  
*3rd Proc. southern Weed Conf.*, Biloxi,  
Miss., 1950, p. 140.

Excellent results were obtained in Florida on fine sandy loam soil by spraying seed beds with a 2½% aqueous solution of ammonium phenyl-dithiocarbamate using 1 gal. per 100 sq. ft. Results were somewhat inferior on dry soil (under 10% moisture). Treatment in the autumn after weeds have died and seed fallen resulted in weed-free beds. Seeding should not take place within 7 days of treatment for which the optimum temperature is 60-70° F. No influence on the results were observed where plant nutrients were applied to the beds after the herbicidal treatment; however, in seed beds to which acid phosphate fertilizer had been applied a few days before spraying with the weedkiller, the results were inferior.

440. GREENHAM, C. G.  
Studies on phytocides. I. Diurnal variation  
in effectiveness of "Methoxone".  
*Aust. J. agric. Res.*, 1950, 1: 148-55, bibl. 17.

As determined by the length for which roots were killed, there was no diurnal variation in the effectiveness

on skeleton weed (*Chondrilla juncea* L.) of spray applications of "Methoxone" at 2-hourly intervals over a period of 24 hours. As determined by reduction in growth above the primary leaves, there was a well-marked diurnal variation in the effectiveness on bean plants (*Phaseolus vulgaris* L.) of drop applications of "Methoxone". [Author's summary.]—C.S.I.R.O.

441. CORNS, W. G.

**Factors affecting plant response to 2,4-D.**

*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 8-12.

Factors such as age of plant, selectivity, application of the herbicide and moisture conditions are discussed.

442. HEAGY, A. B.

**Report on 2,4-D herbicides.**

*J. Ass. off. agric. Chem. Wash.*, 1950, 33: 764-9.

Two methods for the determination of 2,4-dichlorophenoxyacetic acid are recommended provisionally for adoption and two other methods for revision and further study.

443. SCHEXNAYDER, C. A.

**Comparative studies of certain amine salts of 2,4-D.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 4-6.

At the Louisiana Agricultural Experiment Station 5 amine salts of 2,4-D were compared with the triethanol amine of 2,4-D and/or the sodium salt of 2,4-D. Among the plants upon which these chemicals were tested were Johnson grass in sugar cane fields, *Sonchus* spp. [sow-thistle] in strawberries and other crops, and the Mexican weed *Caperonia castaneaefolia*. With Johnson grass the sodium salt and the triethanol amine gave a maximum control of 82% at 3 lb. per acre acid equivalent; triethylamine, diethylamine, and a mixture of the two gave slightly higher degrees of control; monoisopropylamine and ethylmonoethanolamine gave somewhat less satisfactory results. In the strawberry tests a 95% control of all winter broad-leaved weeds was achieved with no significant differences between the 7 chemicals used. The greatest amount of injury to the strawberry plants occurred in the plots sprayed with the diethylamine of 2,4-D and the triethanol amine. The Mexican weed, while almost completely controlled with all herbicides at higher dosage levels, showed different degrees of survival at a low, i.e.  $\frac{1}{4}$  lb., level of application.

444. THORNTON, B. J., AND BOHMONT, D. W.

**Use of growth-regulating compounds in controlling perennial weeds.**

*Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 76-89.

Summarized replies are given to two questionnaires sent to 12 States of the U.S.A. dealing with: (1) the use of growth-regulating compounds in controlling individual species of perennial weeds; and (2) the general aspects of the use of the growth-regulating compounds in controlling perennial weeds. The information relates mainly to 2,4-D, and includes comparisons of the esters and amine salts.

445. LEONARD, O. A., AND HARRIS, V. C.

**The effect of certain hydrocarbon compounds upon the hypocotyls of cotton and soybeans and upon the shoots of nutgrass and Johnson grass.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 91-102.

A study to determine the relationship between the structure of aromatic and aliphatic hydrocarbon compounds and their toxicity to plants.

446. HAVIS, J. R.

**Herbicidal properties of petroleum hydrocarbons.**

*Mem. Cornell agric. Exp. Stat.* 298, 1950, pp. 20, bibl. 12, illus.

Tests were conducted at Cornell to evaluate the toxicity of 31 pure petroleum hydrocarbons in the boiling range from 176 to 572° F. Selectivity was studied as a property of oils and as a characteristic of plants. Methods were studied by which toxic hydrocarbons and herbicidal oils could be made selectively toxic. Test plants used were carrots, peas, lettuce, spinach, onions, and weeds. The results of the evaluation indicated the order of toxicity from highest to lowest to be aromatics, naphthenes, olefins, and straight-chain paraffins. Boiling point influenced toxicity independently of hydrocarbon series. In general, the boiling range of greatest toxicity was about 280 to 510° F. Evidence was obtained showing that the selective toxicity of aromatic hydrocarbons depends on their concentration rather than on the quantity applied, this being in contrast to growth regulators, where the applied quantity is more important than its concentration. In an attempt to account for the differential response of plant species to herbicidal oils, nontoxic oil was found to penetrate plant tissue, but not to penetrate living cells. Only oils that produced injury were found inside parenchyma cells. Thus, toxicity appears to be associated with cell penetration. [From author's summary.]

447. ANON.

**TCA—its range of usefulness.**

*Down to Earth*, 1950, 6: 1: 8-10, illus.

Summaries of research reports on sodium trichloroacetate given at several Weed Conferences in the United States and Canada.

448. WAHLIN, B.

**Bina och hormonderivat. (Bees and hormone derivatives.)**

*Växtskyddsnötiser*, 1950, No. 3, pp. 45-8.

Preliminary laboratory trials at the Swedish Plant Protection Institute, Stockholm, confirmed Danish results, that herbicides of the 2,4-D and methoxone type are toxic to bees. The experiments are being continued. The proof that bees are killed in the field was furnished in the following manner: About 2 decilitres of dead insects sent to the Institute by a beekeeper were shaken in water. Tomato plants sprayed with this water showed the typical response to growth substances. Poisoning may result not only from visiting flowers containing a hormone weedkiller but also from drinking water off treated plants. The recommendations made are: (1) Spray before the weeds are in flower; (2) don't spray in the close



vicinity of beehives; and (3) supply bees with sufficient drinking water.

### Apparatus.

449. KNUST, H. G.

**A power spray for applying chemical weedicides.**

*Cane Gr. quart. Bull.*, 1950, 14: 11-13, illus.

Details are given of a power sprayer mounted on a wheeled tractor for use in cane fields. A 60-gallon container, mounted on a platform at the rear of the tractor, was used, and the full width of the spray boom was 24 ft. 6 in., carrying 12 droppers with nozzles. At 2.1 m.p.h. 21 gallons per acre were applied and 6 acres per hour covered. C.W.S.H.

450. WENHARDT, A.

**What's wrong with sprayers and dusters?**

*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 117-24.

A general discussion of machinery for weed control followed by more specific criticisms of the types now available, but without mentioning particular makes.

451. TALLEY, P. J.

**Equipment for post-emergence control and research and its use.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 116-31, illus.

Equipment is described and illustrated which has been developed primarily for post-emergence weed control in cotton at the Delta Branch Experiment Station, Stoneville, Mississippi. A special type of spray shoe attached to a cultivator is used for the lateral application of the chemical agent to the plant row. The equipment has been used to apply aqueous solutions of certain water-soluble herbicides but most of the tests up to date have employed herbicidal oils.

452. DUNCAN, T. E., FUTRAL, J. G., AND CARTER, E. P.

**Experimental chemical weed control equipment.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 114-15.

A description is given of chemical weed control equipment developed at the Georgia Agricultural Experiment Station.

453. PETERSON, C. E., AND DENISEN, E. L.

**Mechanical protection of foliage and non-selective herbicides for summer weed control in onions.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 309-13, illus., being *J. Pap. 1a agric. Exp. Stat. J-1704*.

A box-like sled with a glass top is described, which, pulled between rows of onions, allowed weeds between the rows to be sprayed without damage to the crop. In preliminary trials in Iowa in 1949 promising results were obtained with Santobrite (sodium pentachlorophenate) and Dow contact herbicide (dinitro ortho secondary butyl phenol). The onion bulbs were severely damaged by two oil sprays, Stoddard solvent and Penola 45 (a straight petroleum distillate).

454. GIESER, A.

**The use of aircraft in application of agricultural chemicals.**

*Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 36-41, bibl. 2.

This paper gives information on the apparatus used in aeroplanes for distributing chemicals, size of particles and their dispersal, the influence of atmospheric conditions, methods of regulating the rate of discharge, and flying procedure. A comparison is made between the use of helicopters and conventional aeroplanes.

455. FICHT, J.

**Machines to control weed growth on roadsides and ditch banks.**

*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 99-103.

Mowing machines adapted for roadside work, tree transplanting machines suitable for large-scale field shelter belt planting and spraying apparatus are mentioned.

456. HODGSON, J. M.

**The electrovator as a method of controlling perennial noxious weeds.**

*Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, p. 109.

The electrovator, a unique patented device developed for weed control, is designed to distribute a charge of electricity into plant foliage as it is pulled over weeds. The effect of treatments with this machine was studied at Idaho on white top (*Papidium draba*), Canada thistle (*Cirsium arvense*) and field bindweed (*Convolvulus arvensis*), but control by this method was found impracticable.

### Particular weeds.

457. HYDE, E. O. C.

**Weed seeds in agricultural seed.**

*Bull. N.Z. Dep. Agric.* 316, [1950 ?], pp. 48, illus.

Enlarged illustrations are provided of seeds of 172 weed species, found largely, but not exclusively, in pastures, with brief notes on the plant in each case.

458. LABBE, A.

**Plantes spontanées de Tunisie à floraison estivale. (Summer flowering wild plants of Tunis.)**

*Bull. Serv. bot. Tunis* 20, 1950, pp. 26, bibl. 20.

Descriptions are given of 64 common weeds of cultivated ground, with notes on their agricultural importance. It is stated whether the plants are toxic, edible, or have a medicinal value.

459. FRASER, G. R.

**Occurrence of weeds in western Canada.**

*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 5-8.

This report is confined mainly to weeds of the persistent perennial class, such as leafy spurge, hoary cress, Russian knapweed, toad-flax, and Canada and perennial sow-thistles.

460. WEED CLASSIFICATION COMMITTEE.

**Report of the weed classification committee—1949.**

*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 174-7.

Three groups embracing many weeds, namely annuals and winter annuals, biennials and herbaceous perennials, and woody perennials, are listed according to their susceptibility to 2,4-D. In the last group a short list is given of trees and shrubs that appear to be more susceptible to 2,4,5-T than to 2,4-D.

461. WOOD, H. E.

**The effect of 2,4-D on perennial weeds.**

*Proc. and Abstr. 3rd west. Canad. Weed*

*Control Conf.*, Edmonton, 1949, pp. 23-8.

The use of 2,4-D on perennial weeds is considered under: (1) control in growing crops, (2) control to obtain complete eradication from cultivated land or land in grass. Up to the present the former probably offers the greater possibilities. Notes are given on results achieved with Canada thistle and perennial sow-thistle, leafy spurge, hoary cress, Russian knapweed, field bindweed, poverty weed, wild morning glory, toad-flax, and horsetail.

462. HITCHCOCK, A. E., AND OTHERS.

**Growth and reproduction of water hyacinth and alligator weed and their control by means of 2,4-D.**

*Contr. Boyce Thompson Inst.*, 1950, 16: 91-130, bibl. 5, illus.

Tests carried out in 1948 and 1949 showed the following results: 2,4-D at 8 lb. per acre was effective throughout the year in causing water hyacinths (*Eichhornia crassipes*) to sink in two or three months; the esters of 2,4-D were of about equal effectiveness to the amine salt; 2,4-D was more effective than 2,4,5-T; the amine salt of 2,4,5-T was more effective than the isopropyl ester; hyacinths were killed more readily in August than in June; it was difficult in practice to destroy all hyacinths with one 2,4-D spray and a second spray had to be applied to surviving plants before any substantial reinfestation had occurred. The production of seedling hyacinths under natural conditions in Louisiana proved unimportant in the rapid spread of this species. Alligator weed (*Alternanthera philoxeroides*) was also controlled with the 8 lb. per acre application of the 2,4-D amine salt, unless very deeply rooted. September and October treatments were more effective than March to August treatments. When chopped hyacinths and alligator weed were thrown into experimental pits much of the material floated and there was abundant regrowth in one month. If the chopped material was sprayed with 2,4-D the segmented hyacinths sank in 23 days and the alligator weed in 57 days. Approximately 500 acres of waterways infested with hyacinths and alligator weed were cleared by applying 2,4-D at the rate of approximately 8 lb. per acre either by helicopter, by boat, or from the shore [see also *H.A.*, 20: 1592]. [From authors' summary.]

463. BRUNS, V. F.

**Submersed aquatic weed control in irrigation channels.**

*Proc. 12th annu. western Weed Cnfr.*

Denver, Colo, 1950, pp. 55-8.

A great improvement has been made in the control of submersed aquatic weeds in irrigation channels through the advent of aromatic solvents compared with the older mechanical and chemical controls. Results

obtained in 1949 in Washington, Idaho and Arizona indicate that one concentrated treatment per season is sufficient to allow free water flow except in areas with continuous or very long periods of irrigation. While no definite superiority of one commercial product over another is shown, Type A solvents (boiling point range 278-420° F.) generally have given somewhat better results than Type B solvents (boiling point range 275-360° F.). Concentrations of 400-600 p.p.m. introduced into the stream over a 30-minute period are considered to be more effective than the standard rate of 300 p.p.m., especially for the more stubborn species. Spraying equipment and methods of application are discussed.

464. HODGSON, J. M.

**Control of emergent aquatic weeds.**

*Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 52-5, bibl. 10.

Work is reviewed on the control of cat's tail (*Typha latifolia*), water smartweed (*Polygonum* spp.), tules (*Scirpus* spp.) and watercress (*Nasturtium* spp.), which present a serious problem in irrigation systems. While some promising results particularly with 2,4-D are reported, the present means of control are generally quite ineffective and costly.

465. WILLIS, S. J.

**The control of hoary pepperwort on light soils.**

*Agriculture, Lond.*, 1950, 57: 270-3, bibl. 4.

Further trials with MCPA against hoary pepperwort are described [see *H.A.*, 19: 3004]. Better control was obtained, in spring corn, with sprays than with dusts, and it is recommended that the treatment be repeated in at least 3 years, especially when dusts are used. As a spray 2 lb. per acre MCPA gave as good results as 4 lb.; as a dust 4 lb. MCPA gave somewhat better control than 2 lb., but the differences were not significant in any year, and it is doubtful if the extra cost would be justified.

466. ORCHARD, H. E.

**Inkweed (*Phytolacca octandra* L.).**

*J. Dep. Agric. S. Aust.*, 1950, 53: 449-51, illus.

Inkweed, a native of tropical America, has now spread throughout the warmer parts of Australia and New Zealand. Birds and rodents, which carry the seed, are chiefly responsible for its spread. It is poisonous but also has medicinal properties. Hormone-like herbicides, such as 2,4-D and MCPA, will all successfully kill it, especially when applied before flowering.

467. PHILLIPS, R. P.

**Strains of Johnson grass in Louisiana.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 29-30.

From differences observed at the Louisiana Agricultural Experiment Station, Baton Rouge, in pollen production, self-compatibility, clonal vegetative features, and seed characteristics, the existence of several strains of Johnson grass is indicated.

468. EASTERBROOK, B.

**Chemical control of lantana.**

*Qd agric. J.*, 1950, 71: 26-7.

Experience in Queensland suggests that lantana can be



killed consistently by Methoxone or the sodium salts of 2,4-D only if all old plants are first brushed and then sprayed some weeks later when there is abundant, leafy re-growth. Formulations of 2,4,5-T alone or combined with 2,4-D are more effective than 2,4-D alone, especially on large bushes, but the extra cost of 2,4,5-T is probably not justified.

469. LEONARD, O. A., AND HARRIS, V. C.  
Nutgrass control with methyl bromide.  
3rd Proc. southern Weed Conf., Biloxi,  
Miss., 1950, pp. 132-4.

1. One pound of methyl bromide per 100 sq. ft. eradicated nut grass in spaded soil covered with Sisalkraft paper in winter (temperature 49° F.), in spring (temperature readings not made), in summer (temperature 85° F.), and in the fall (temperature 60-70° F.). 2. One-pound methyl bromide treatment eradicated nut grass from unspaded soil in one experiment and did not eradicate it in another. 3. The 48-hour covering was more effective than the 24-hour cover. 4. Holes in the cover resulted in poor control. [Authors' summary.]—Miss. agric. Exp. Stat.

470. COWART, L. E., AND RYKER, T. C.  
Studies on the control of nut grass (*Cyperus rotundus*).  
3rd Proc. southern Weed Conf., Biloxi,  
Miss., 1950, pp. 135-9, bibl. 4.

Attempts made at Louisiana to control nut grass by repeated applications of 2,4-D and TCA resulted in significant initial reduction in stands, but no permanent reduction of the "nuts" in the soil was found. Various combinations of the 2 chemicals were no more effective.

471. KUMAR, L. S. S., SOLOMON, S., AND RAO, M. V. V.  
Preliminary studies in the use of synthetic hormones as weed-killers in the Bombay Province.  
Proc. Indian Acad. Sci., Sect. B, 1949, 30:  
243-8, bibl. 3, illus.

Trials are described with Methoxone or Agroxone (10% sodium-4-chloro-2-methyl-phenoxyacetate), Ferroxone (80% of the sodium salt of 2,4-D), Weed-nomore (40% of the butyl ester of 2,4-D) and Weedone (10% of an unstated compound of 2,4-D). The responses of 43 common Indian weeds to spraying with these herbicides are tabulated. A 0.2% solution was effective against *Cyperus rotundus*, and a 0.1% solution against *Striga lutea* and *S. densiflora*, including seedlings developing below ground. Though many vegetables and legumes are very susceptible, strawberries, tea and coffee are stated to be resistant.

472. BEILIN, I. G.  
*Orobancha muteli* F. Schultz and its specialization. [Russian.]  
Doklady Akad. Nauk S.S.S.R., 1948, 61:  
943-4, bibl. 3 [received 1950].

*Orobancha muteli* occurs in countries around the Mediterranean Sea. According to Beck-Mannagetta it parasitizes 55 species of plants in 15 families, including a number of crop plants. Beilin found that it developed well on cruciferous plants but not on certain other plants, e.g. eggplant and carrot. Tomato and tobacco were infected, but potatoes (3 varieties tested) proved

immune. In relation to these observations the possibility of specialization in *Orobancha muteli* is discussed. In ground infested with seeds of the parasite only immune crops should be grown.

473. ANON.  
Ontario highways fight ragweed.  
Down to Earth, 1950, 6: 1: 5, illus.

Both the ester and amine formulations of 2,4-D at 1.5 lb. acid equivalent per acre gave very satisfactory control of ragweed.

474. LATIMER, R. D.  
Maintenance and improvement of our soil fertility.  
J. Dep. Agric. S. Aust., 1950, 53: 455-8.

In this paper, which stresses the importance of humus in the soil, it is stated that stinkwort, a noxious weed, is an indication of phosphate deficiency.

475. HEFER, S. V.  
The control of witchweed.  
Fmg S. Afr., 1950, 25: 263-5, illus.

After reviewing work by Saunders (1933) on witchweed, *Striga lutea* Lour., laboratory trials are described which showed that solutions in which sunflower and cowpeas as well as grass species had been grown will promote rapid germination of witchweed seeds provided these have previously been kept damp for a fortnight. As the parasite does not infest sunflowers and cowpeas their use as catch crops in infested land should result in its death.

#### Weed control in vegetables and potatoes.

(See also 1228, 1231.)

476. ANON.  
Destrucción de malezas en cultivos de zanahoria, hinojo, apio y perejil con solventes aromáticos. (Control of weeds in carrots, fennel, celery and parsley with aromatic solvents.)  
Idia, 1949, 2: 20: 14.

Good control, without damage to the crops, was given by a kerosene herbicide (13 or 20% aromatic content) used at the rate of 800-1,000 l. per ha. Application when the plants had 2-4 leaves and the weeds were 6-8 cm. high gave best results.

477. ARLE, H. F.  
The effect of aromatic solvents and other aquatic herbicides on crop plants and animals.  
Proc. 12th annu. western Weed Conf.,  
Denver, Colo, 1950, pp. 58-60.

Results of glasshouse and field experiments conducted by the Bureau of Plant Industry to test the toxicity of aromatic solvents, although not conclusive in all cases, suggest that crop plants are not damaged by concentrations required for weed control in irrigation waters. Lettuce, lima beans, orchard grass and sweet corn were among the test plants. Because of the strong odour and disagreeable taste, it appears unlikely that animals would drink treated water containing appreciable concentrations.

478. WILSON, E. H., AND EASLEY, T.  
**Potassium cyanate as a contact herbicide.**  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 18-22.

Potassium cyanate has been in commercial use for 2 years in America under the trade name AERO Cyanate, Weedkiller. It has been mostly used in onions, but can be successfully used as a selective herbicide in asparagus, gladioli, lilies, irises, peas, cabbages, strawberries during the dormant season, and small grains, in addition to other members of the onion group which include garlic, leeks, shallots and chives. Crabgrass, chickweed and many broadleaf weeds have been controlled in lawns with cyanate. The properties of potassium cyanate and the factors affecting results with it are discussed.

479. ANDERSON, E. T.  
**Chemical weed control experiments with horticultural crops. Summary of work carried out in various parts of Canada.**  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 66-71.

In general, pre- and post-emergence spraying trials carried out in various parts of Canada were promising. Post-emergence applications of 2,4-D at  $\frac{1}{2}$  lb. and 1 lb. acid equivalent per acre gave variable results in potatoes. Pre-emergence applications at 1 and 2 lb. rates gave good control of weeds without causing yield depression. The sodium salt and butyl ester of 2,4-D at  $\frac{1}{2}$  lb. and 1 lb. delayed maturity in sweet corn in one trial, while at two other stations it gave good weed control and no reduction in yield. Post-emergence sprays of aero cyanate on onions controlled weeds satisfactorily when two applications were made. Varsol was effective in controlling weeds in carrots and celery, but foliage burning occurred on celery in one season. Another petroleum fraction, QXS-16, also injured celery plants, but showed promise with other vegetables. Sodium TCA applied 6 days before seeding seriously affected germination and later development of peas and beans, but did not affect carrots and turnips.

480. ANDERSON, G. R., AND BAKER, G. O.  
**Some effects of 2,4-D in representative Idaho soils.**  
*Agron. J.*, 1950, 42: 456-8, bibl. 16, being *Res. Pap. Idaho agric. Exp. Stat.* 303.

Peas, beans, red clover and alfalfa were used in a 2-year pot experiment to determine the effect of the ammonium salt of 2,4-D on nodulation and plant growth and on its residual action in the soil. During the first year all legumes showed sensitiveness to low concentrations of 2,4-D in the soil, peas and alfalfa being most susceptible, while in the second year, except in soil kept under cold, wet conditions, no residual effect was observed. The efficiency of nodulation was not retarded, except with beans when grown in soil treated with 6 lb. per acre of 2,4-D. Examination of the action of the 2,4-D salt on soil micro-organisms indicates that the inhibition of growth is transitory.

481. BELGIUM (SERVICE DES CONSEILLERS D'HORTICULTURE DE L'ÉTAT).  
**La lutte contre les mauvaises herbes chez les carottes. (Weed control in carrots.)**  
*Rev. Agric. Brux.*, 1950, 3: 843-5.

In the second year of small-scale trials with carrots, carried out by the Belgian horticultural service, Shell Weedkiller again proved its value as a herbicide for this crop. The dosage recommended varies from 5 to 10 l. per 10 m<sup>2</sup>, according to the size of the weeds and to the temperature, 15-18° C. being the optimum. No injury occurred when the herbicide was applied at the two-leaf stage of the crop plants.

482. WARREN, G. F., AND ELLIS, N. K.  
**Results of 1949 experiments on control of weeds in onions.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 302-8, bibl. 10, being *J. Pap. Purdue agric. Exp. Stat.* 434.

In pre-emergence trials on peat soil of pH 5.2 in Indiana the following herbicides gave best control of broad-leaved weeds without reducing onion yields: the amine salt of 2,4-D at 1 lb. acid equivalent, calcium cyanamide dust at 200 lb., 9.4% pentachlorophenol in oil at 2½ gal. and the sodium salt of pentachlorophenol at 7.5 lb. per acre. The lack of injury to the onions may have been due to the absence of heavy rain during 2 weeks after application. The sodium salt of TCA at 8.8 lb. acid equivalent per acre gave excellent control of grasses as well as broad-leaved weeds, but decreased the size and yield of onions. In post-emergence trials considerable weed control was obtained without reducing onion yields with: 2 to 3% sulphuric acid and 15% phosphoric acid, both at 100 gal. per acre, potassium cyanate at 10 to 20 lb., the sodium salt of pentachlorophenol at 2 to 4 lb., and the sodium salts of tri- and tetrachlorophenols at 16 lb. per acre.

483. ERICKSON, L. C.  
**A summary on the control of annual weeds in potatoes and beans with selective herbicides in the Western Region.**  
*Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 95-102.

Information, mainly on the use of 2,4-D, obtained from 4 research workers in the Western States is summarized.

484. TIMMONS, F. L.  
**Control of annual weeds in sweet corn by pre-emergence treatment with 2,4-D and TCA.**  
*Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 112-13.

Sodium salt and micronized pure acid formulations of 2,4-D were compared at stated concentrations in spray applications made 5 days after planting and just before emergence of sweet corn (Golden Hybrid 2439) in Utah. Combinations of sodium TCA and the sodium salt of 2,4-D were also tested. The chemical treatments were compared with hoed and unhoed controls in randomized blocks on cultivated and uncultivated series of artificially weed-infested plots. The results indicate that the TCA and 2,4-D combination and the micronized 2,4-D acid were the most effective and, in cultivated plots, they also increased the number of stalks and the yield of ears.

485. LANA, E. P.  
**The effect of pre-emergence sprays on the growth, development and yield of direct seeded tomatoes.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 319-27, bibl. 3, being *J. Pap. Ia agric. Exp. Stat.* J-1695.



In 1948 and 1949 Stokesdale tomatoes sown direct in Iowa in mid-April gave comparable yields to transplanted tomatoes. Satisfactory weed control was obtained with herbicides sprayed 9 to 12 days after sowing, which was about 5 days prior to emergence. Materials used were Stanisol and white kerosene both at 80 gal. per acre, Santobrite (sodium pentachlorophenate) at 5 lb., and the amine, ester and sodium formulations of 2,4-D at 1, 2 and 4 lb. acid equivalent per acre. The two higher rates of 2,4-D adversely affected the stand of tomato plants and reduced their yield; the remaining treatments did not affect yields.

### *Weed control in fruit crops.*

(See also 248, 1220.)

486. ROBBINS, W. W.  
Control of annual weeds in orchards and vineyards.  
*Proc. 12th annu. western Weed Conf.*,  
Denver, Colo, 1950, pp. 102-3.

The advantages of non-tillage of citrus orchards are briefly dealt with. The materials needed for chemical weed control and their cost are discussed. The use of general contact herbicides in vineyards is becoming a fairly common practice in California, but 2,4-D is to be avoided. Chemical weed control in deciduous orchards is also mentioned.

487. TELFER, S. S.  
How we control quack grass.  
*Wis. Hort.*, 1950, 40: 280, illus.  
A note by a grower about the successful use of Standard Weed killer "F"—(Stoddard Solvent with Zylene added) against quack [couch] grass growing through the mulch around trees in a young apple orchard under sod. Apart from burning the lower leaves the trees do not appear to be affected.

488. CARTER, E. P., SAVAGE, E. F., AND WEINBERGER, J.  
Progress report on control of Bermuda grass in Georgia peach orchards.  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 50-8.

Good control and no injury was reported for the 1948 season [see *H.A.*, 20: 236]. Results presented for 1949 show that while 70 to 118 lb. acid equivalent of sodium TCA per acre gave erratic to good control of Bermuda grass on light soils, they produced marked foliage injury on the peach trees. Heavy soil helps to prevent such injury. Late summer applications caused less injury than spring treatments, and on heavy soils late applications appeared to give satisfactory control of the weed without injuring the trees.

489. CARLSON, R. F., MOULTON, J. E., AND HAMNER, C. L.  
Protection of strawberry plants with activated carbon in pre-planting applications of 2,4-D.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 268-70, bibl. 5, illus., being *J. Art. Mich. agric. Exp. Stat.* 1124.

Dipping strawberry plants in dust of activated carbon (Nuchar C) before planting them in soil that had been sprayed with 2,4-D protected them from injury. Untreated plants showed much injury and considerable

mortality particularly when only 0.3 in. of rain fell in the 24 days following planting.

490. NYLUND, R. E.  
The use of 2,4-D for the control of weeds in strawberry plantings.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 271-5, bibl. 9, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2525.

In July, 1948, 8 spray treatments were applied at a rate of 80 gal. per acre to the June-bearing strawberry variety Arrowhead: the sodium salt of 2,4-D at 1, 2, 3 and 4 lb. acid per acre, the isopropyl ester of 2,4-D at 0.25, 0.5 and 1 lb. acid per acre, and an unsprayed control. The two lower rates of both herbicides controlled weeds for about 5 weeks, after which the plots were re-sprayed. On 6 June, 1949, when most of the crop had set, all the treatments were repeated on half the plots. None of the treatments affected the vigour of the strawberry plants, as measured by number of leaves and number of rooted runner plants, nor did they reduce yields. The higher rates of 2,4-D satisfactorily controlled broad-leaved weeds from 9 July to the end of the growing season.

491. WILSON, W. F., AND STAMPER, E. R.  
Chemicals for the control of weeds in strawberries.  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 59-60.

Applications of 2-3 lb. of 2,4-D two weeks before planting caused some injury to the plants, but less than when the 2,4-D was applied just after planting. Symptoms of the injury disappeared within 2 weeks. Owing to heavy rain the control of weeds was poor. The 2 lb. treatment of 2,4-D acid equivalent or 6 gallons of Sinox W (a dinitro compound) applied 2 weeks before planting the strawberries did not reduce yields. Hoeing in January just before mulching was much easier in treated plots, and itself had a beneficial effect on yields.—*La agric. Exp. Stat.*

### *Weed control in tropical crops.*

492. CRAFTS, A. S., AND EMANUELLI, A.  
The eradication of weeds in pineapple fields.  
*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 93-6.

Observations in Puerto Rico suggest that there are two related faults in the method of cultivating pineapples: (1) lack of organic matter in the soil and (2) periodic destruction of roots near the surface in weeding. It is suggested that the first could be corrected by the use of manure, filter press cake or cane trash, and the second by the use of emulsified reinforced oil sprays. None of the selective oils or dinitros give adequate weed control and 2,4-D is unsuitable because of its effect on the flowering of pineapples. Where chemical weed control is adopted, planting in single rows would seem to be preferable to the present practice of planting 2 or 3 rows close together with a lane between.

493. STEVENSON, G. C.  
Experiments on weed control with "Agrox-one" in British Guiana.  
*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 62-5.

Trials at the Sophia Sugar Experiment Station have shown Agroxone (sodium 2-methyl 4-chloro-phenoxy-acetate) to give excellent control of wild eddo (*Caladium* sp.) especially with the addition of 2% of a strong soap solution. Preliminary trials suggest that virtually complete and economic control will be obtained with 2 sprayings, 6 to 8 weeks apart, each at the rate of 2 gal. Agroxone per acre and using a 1 in 100 spray solution plus 2% soap solution as a spreader. Promising results have also been obtained with pre-emergence sprays of Agroxone against other weeds.

494. BORRI, M.

**Herbicides for the cane fields.**

*Proc. 1949 Mtg B.W.I. Sugar Tech.*,  
Antigua, pp. 103-8.

Contact and selective herbicides are described. The ammonium salt of 2,4-D has been successfully used as a pre-emergence selective weed-killer in Puerto Rico. It is applied 8-10 days after planting at the rate of 2.5 lb. 2,4-D acid per acre. Grass weeds as well as broad-leaved weeds are controlled, and the results are more satisfactory on heavy than on light soils. The types of sprayers and nozzles used are described.

C.W.S.H.

495. VALLANCE, L. G.

**The use of pre-emergence and contact sprays for weed control.**

*Cane Gr. quart. Bull.*, 1950, 14: 4-10, illus.

Trials were carried out at five centres to test the efficiency of (1) 2,4-D at 2½ lb. and 4 lb. per acre as a pre-emergence spray, and (2) sodium pentachlorophenate plus 2,4-D in a base of diesel oil, tar oil or creosote as a contact spray applied when the effect of the pre-emergence spray had worn off. 2,4-D at 4 lb. per acre was very effective as a pre-emergence spray except on heavy soils and where nut grass was the principle weed. 2½ lb. per acre was generally found to be insufficient. Using a knapsack sprayer, 50-60 gal. were needed per acre, but half this amount was sufficient when using a power sprayer. Where most successful the pre-emergence spraying gave control from September till January or February and no further treatment was necessary. Contact sprays were less successful, but trials are continuing.

C.W.S.H.

496. STAMPER, E. R., COWART, L. E., AND RYKER, T. C.

**Studies on the comparative efficiencies of various herbicides on grasses and other weeds.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 15-17.

Four proprietary herbicides inducing physiological effects on plants similar to the trichloroacetates (TCA) were compared with three TCA formulations to determine their effectiveness against grass weeds in cotton and sugar cane and on fallow land. Tabulated results of 5 experiments involving pre- and post-emergence applications are presented.

497. STAMPER, E. R., AND CHILTON, S. J. P.  
**Experiments on the field control of Johnson grass in sugarcane.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 35-8.

Large-scale experiments were begun on the prevention

of reinfestation by Johnson grass seedlings of sugar cane lands which had been freed of the weed by 8 to 10 ploughings. The results, though variable, indicate that the amine salt of 2,4-D plus flaming and TCA treatments gave the best control, resulting in increased stands of cane. 2,4-D alone or in combination also gave increases in yield, but yields following the use of TCA were reduced, thus suggesting an injurious effect.

498. HAGOOD, E. S.

**Control of Johnson grass rhizomes in sugar cane.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 31-4.

A 99.9% reduction in rhizome population was achieved with 6 deep, i.e. 24-inch, ploughings in Louisiana in 1949. Chemical control with sodium trichloroacetate and with sodium chlorate+santobrite (85% sodium pentachlorophenate) at stated quantities, while considerably reducing the weed, did not eradicate it.

499. GIBBENS, R. T., Jr.

**Commercial control of Johnson grass in sugarcane in 1949.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 39-41.

A combined chemical and mechanical control programme for 1950 is suggested.

500. PORTER, W. K., Jr., AND TALLEY, P. J.

**Spotting agents for Johnson grass control.**

*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 42-8.

Of 10 herbicides tested at the Delta Branch Experiment Station, Stoneville, Mississippi, during 1949, sodium chlorate and TCA applied early in the season gave the best control of small areas of established Johnson grass in cultivated fields.

501. YUEN, Q. H., AND MILLER, R. C.

**Controlling manienie grass with TCAA and STCA.**

*Hawaii. Plant. Rec.*, 1950, 53: 183-92, illus.

Manienie or Bermuda grass is a troublesome cane weed in Hawaii particularly in the drier areas. Experiments are described from which a number of effective herbicides have been evolved, notably a combination of the isopropyl ester of 2,4-D with either trichloroacetic acid or sodium trichloroacetate (TCA). An aqueous solution of sodium TCA is nearly as effective and with proper dilution it can be used in the cane rows. Up to 4 applications are needed at 3-month intervals, the last one or two being spot, rather than general, sprayings. Recommendations are given for the preparation of these and other formulations.

**Weed control among trees and shrubs.**

502. BROWN, J. G.

**Persistence of 2,4-D in plant tissues.**

*Plant Dis. Repr.*, 1950, 34: 127, bibl. 2.

Mature trees of *Melia azedarach* growing in a lawn which had been treated with 2,4-D showed, in the following year, leaves grading down in size from those with normal leaflets to those with only mere vestiges. Some leaflets had fringed margins and chlorosis was marked. It is considered that this disorder was due to the 2,4-D applied to the lawn.



**Control of undesirable trees and shrubs.**

503. CRAIG, H. A.

**Eradicating woody growth with chemicals in Manitoba.***Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 89-93.

The main species of trees and shrubs occurring along road sides, power and telephone lines, drainage and irrigation ditches were willow, poplar, bur or scrub oak, hazel, saskatoon and wild rose. Herbicides tested were 2,4-D, 2,4,5-T, both singly and in combination, and several commercial "brush killers".

504. CORNS, W. G.

**Experiments on chemical control of woody growth: report for Alberta and Saskatchewan.***Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 93-8.

Results of trials with 2,4-D, 2,4,5-T and various "brush killer" mixtures of esters of the two chemicals are reported in a general discussion, followed by 8 abstracts relating to specific experiments.

505. ELWELL, H. M.

**From brush to grass.***Fmg. Norwich*, 1950, 4: 174-7, 181, illus.

An account of experiments conducted at the Red Plains Conservation Experiment Station, Oklahoma, U.S.A., on the eradication of brush and small trees with herbicides. [See *H.A.*, 20: 2709 and 2710.]

506. GREEN, K. R.

**2,4,5-T hormone-type weedicide to control blackberry and other woody plants.***Agric. Gaz. N.S.W.*, 1950, 61: 341-4, illus.

Recommendations for rates of application are 3 lb. of 2,4,5-T per acre, or 2 lb. of 2,4,5-T plus 2 lb. of 2,4-D per acre, the quantities diluted with 100-120 gal. of water, and applied as a fine spray at a pressure of 100-120 lb. per sq. in. If susceptible garden plants or fruit trees are near, a coarser spray and much lower pressures should be used to prevent spray drift.

507. ORCHARD, H. E.

**Weeds of South Australia. Blackberry (*Rubus fruticosus* L.) and allied *Rubus* species.***J. Dep. Agric. S. Aust.*, 1950, 53: 495-8, illus.

Four species of *Rubus* grow wild in S. Australia, viz. *R. fruticosus* (blackberry), *R. laciniatus* (cut-leaved blackberry), *R. moluccanus* (moluca bramble), and *R. parvifolius* (small-leaved bramble). Their characters are tabulated for easy identification. For their eradication spraying with 2,4,5-T is recommended.

508. YOUNG, D. W., AND FISHER, C. E.

**Factors affecting the absorption and translocation of herbicides in mesquite (*Prosopis juliflora*).***Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 41-8.

Investigations carried out in Texas indicate that absorption and translocation of herbicides by mesquite is influenced by the stage of growth of the plant, the chemical used, the duration of temperature above

80° F. immediately after treatment, and the period of humidity above 80% when the temperature is moderate. The 2,4,5-T ester in water was absorbed and translocated more consistently than any of the other herbicides tested.

509. GERTSCH, M. E., STAMPER, E. R., AND RYKER, T. C.

**Effect of chemicals on Chickasaw rose (*Rosa bracteata*).***3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 169-71.

Results of preliminary tests, carried out in Louisiana in 1949, with triethanol amine salts and the isopropyl esters of 2,4-D and 2,4,5-T are presented. It is too early yet to make general recommendations for the control of Chickasaw rose.

**Noted.**

510.

a ALLEN, W. W.

**Progress report on volatility of some esters of 2,4-D.***3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 7-12.

b ANDERSON, E. G.

**The registration of herbicides in Canada.***Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 140-3.

c BLAIR, B. O.

**Recent results of basic physiological studies of mesquite in the southwest.***Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, p. 104.

d CARTER, E. P.

***Acanthospermum hispidum*, a noxious weed in Georgia.***3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 23-5.

e CRAFTS, A. S.

**The physiology of weed control.***Proc. 12th annu. western Weed Conf.*, Denver, Colo, 1950, pp. 61-9.

f EGLER, F. E.

**Herbicide effects in Connecticut vegetation, 1949.***Bot. Gaz.*, 1950, 112: 76-85, bibl. 3, illus.

g HENRIET, J.

**Chimie des herbicides à base de l'acide 2,4-dichlorophénoxyacétique. (The chemistry of 2,4-D herbicides.)***Ann. Gembl.*, 1950, 56: 1-8, bibl. 15.

h JAMES, E.

**Granular cyanamid as a pre-emergence weed control.***3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, p. 175.

i KONDO, M., AND KASAHARA, Y.

**Untersuchungen der Unkrautsamen Japans VIII. Leguminosae (I). (A study of the weed seeds of Japan VIII. Leguminosae (I).)***Ber. Ōhara Inst. landw. Forsch.*, 1942, 9: 1-13, illus. [received 1950].

- j KONDO, M., AND KASAHARA, Y.  
Untersuchungen über die Keimung der Unkrautsamen Japans. I, II. (A study of the germination of Japanese weed seeds. I and II.)  
*Ber. Ōhara Inst. landw. Forsch.*, 1942 9: 14-21, bibl. 4, and 22-8 [received 1950].
- k LEGGETT, H. W.  
Combining cultural and chemical weed control practices.  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 148-50.
- l LEWIS, N. G.  
Problem of irregular germination of weed seeds.  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 163-6. Statistical, physiological and environmental aspects are discussed.
- m LOUSTALOT, A. J.  
Studies on the persistence and movement of sodium trichloroacetate in the soil.  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 13-14.  
For an account of this work see *H.A.*, 20: 2679.
- n McDONALD, B. K.  
Tillage practices for control of wild oats, tartary buckwheat, and other weeds having delayed germination.  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 167-71.
- o MENDES DA PONTE, A.  
Fito-hormonas na munda selectiva. (Plant hormones as selective herbicides.) [English and French summaries  $\frac{1}{2}$  p. each.]  
*Agron. angol.*, 1949, 2: 75-107, bibl. 185. A review of the literature, concerned mainly with 2,4-D.
- p MINISTRY OF AGRICULTURE, LONDON.  
*Spurrey [Spergula arvensis L.]*.  
*Adv. Leaflet. N.A.A.S. Lond.* 182, 1950, pp. 2, illus.  
With notes on methods of control.
- q NATION, H. A.  
Two chemicals appear promising for control of palmettos.  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 172-4.  
Tests with sodium TCA and 2,4,5-T in Florida show promise.
- r NEWMAN, A. S., AND THOMAS, J. R.  
Decomposition of 2,4-dichlorophenoxyacetic acid in soil and liquid media.  
*Proc. Soil Sci. Soc. Amer.* 1949; 1950, 14: 160-4, bibl. 7.
- s OLSON, P. J., AND DOUGLAS, A.  
2,4-D dust vs. 2,4-D spray.  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 103-17.
- t RIPLEY, P. O.  
Weed control in Britain and Western Europe.  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 124-30. A general account.
- u SEXSMITH, J. J.  
Tillage for the eradication of deep-rooted perennials.  
*Proc. and Abstr. 3rd west. Canad. Weed Control Conf.*, Edmonton, 1949, pp. 150-4.
- v SHIVAPURI, T. N., AND TYAGI, B. P.  
Methoxone as an eradicator of the weed *Pluchea lanceolata* (Vern. Baisurai).  
*Indian Fmg.*, 1950, 11: 116.
- w SOUTHWICK, L.  
Recent developments in chemical brush control.  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 150-9.  
2,4,5-T has increased in importance by comparison with 2,4-D.
- x WHITE, C. W.  
Problems of chemical brush control in the Tennessee Valley region.  
*3rd Proc. southern Weed Conf.*, Biloxi, Miss., 1950, pp. 163-8.
- y WILLIS, S. J.  
The control of buttercups on permanent pasture.  
*Agriculture, Lond.*, 1950, 57: 359-64, bibl. 4.

## VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

*General.*

(See also 76, 95, 102, 195, 224, 362, 373, 422, 458, 477-480, 1205, 1213, 1216, 1222, 1228.)

511. PHILIPP, F.  
Gemüsebauversuchsanlagen und Sortenprüfungen. (Experimental vegetable stations and variety trials.)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 154-77, illus.

The activities are described of the vegetable experimental stations at Neusiedl am See, Zinsenhof and Schonbrunn, where variety testing for the official Austrian register (see abstract 513 below) is carried

out. Such characters as appearance, flavour, vitamin content and storage quality are included in the evaluation.

512. KRICKL, M.  
Züchtungs- und Versuchsarbeiten mit verschiedenen Gemüsearten. (Breeding and other work with certain vegetables.)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 177-86, bibl. 2.

(1) Cabbage. Breeding aims (a) at reducing the length of the stalk within the head, thereby improving its compactness and quality, and (b) at increasing frost resistance of the heads during storage in clamps.



(2) The softening of radishes in several varieties was considerably reduced by selection. (3) Carrots. A correlation was found to exist between size of seed and the proportion of first-grade roots. Commercial seed, it is recommended, should therefore not be allowed to contain grains under 0.8 mm. A selection of plants with large seeds should be attempted. (4) Four weeks' storage at 40, 45 or 50° C. after 15 February controlled bolting almost completely in onion sets, even in the large-sized groups. A constant temperature of 30° C. during the whole storage period appears to have a similar effect. By contrast, a low storage temperature of about +4 to +6° C. is needed for the selection of non-bolting strains.—Bundesanst. f. Pflanzenbau u. Samenprüfung, Vienna.

513. PAMMER, F.  
Geschäftsführung der Zuchtbuchkommission. (Report of the commission in charge of the official variety register.)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 34-7.

A classified list is given of varieties appearing on the official Austrian register which includes potatoes and certain vegetables. The object of the scheme is to evaluate the varieties submitted for testing by Austrian seed firms, a list of which is appended.

514. LAMM, R., TOMETORP, G., AND HINTZE, S.  
Klassificerande sort- och stamförsök med köksväxter 1945-1949. (Vegetable variety trials 1945-1949.) [English summary 3½ pp.]  
*Medd. Trädgårdsförs. Malmö* 58, 1950, pp. 46, bibl. 14.

Descriptions are given of new varieties and strains of the following vegetables adjudicated "first-class élite" or "first-class" in the Swedish State variety trials: marrow-fat and sugar peas, glasshouse cucumber, cauliflower, muskmelon, carrot, parsnip, radish and spinach.

515. BERWICK, E. J. H., AND TAN AH KING.  
Vegetable variety trials at Cameron Highlands in 1949.  
*Malay. agric. J.*, 1950, 33: 119-35, illus.

This paper describes a continuation of trials reported in *Ibid.*, 1950, 33: 5-22 (*H.A.*, 20: 1596). The following further varieties have given high yields and are worth introducing or retaining for commercial cultivation: climbing French bean (St. Louis Perfection), dwarf French bean (Australian Canadian Wonder), sweet corn (Cream O'Gold), lettuce (Imperial No. 847), Chinese cabbage (Japanese varieties Aichi and Chihfu), cabbage (local variety "Utility" propagated by suckers), celery (local Chinese variety), parsnip (Burpee's Hollow Crown), radish (Australian French Breakfast), "lobak" or Chinese turnip (Japanese varieties Shogoin Daimaru, Miro Kokonoka, Suikomi Ninengo), sugar pea (Maule's Giant Sugar Pod), leeks (American Flag and Musselburgh), rhubarb (local C.H.12). In a potato trial Dutch varieties, particularly Voran, proved superior in yield and in resistance to blight to the commonly grown local variety. Later generations were, however, unproductive and the question of seed supplies is therefore of great importance. C.W.S.H.

516. HOPP, R., AND MERROW, S. B.  
Quality of vegetables for home freezing.  
*Pamph. Vt agric. Exp. Stat.* 22, 1950, pp. 14, bibl. 7.

Varieties adapted to conditions in Vermont and suitable for freezing are given for asparagus, snap and lima beans, beets, broccoli, brussels sprouts, carrots, cauliflower, kohlrabi, peas, rhubarb, spinach, squash, sweet corn and vegetable greens.

517. GERM, H.  
Keimversuche mit "Welan". (Germination trials with Welan.)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 27-8.  
KRICKL, M.  
Spritzversuch mit "Welan". (Spraying [seedlings] with Welan.)  
*Ibidem*, pp. 187-9.

Soaking vegetable seeds in, and spraying seedlings with, Welan, a proprietary seed fertilizer, has not resulted in any significant benefit in preliminary trials carried out at the Vienna seed testing station. The tests are, however, to be continued.

518. VAN HIMBEECK, C.  
Les machines de repiquage. (Transplanting machines.)  
*Rev. Agric. Brux.*, 1950, 3: 383-402, illus.

A description, with plans and illustrations, of English, German and French models of transplanting machines. Figures are given which show that mechanical transplanting is 4-5 times quicker and 2-3 times cheaper than transplanting by hand.

519. SUGAWARA, T.  
Studies on the formation of ascorbic acid (vitamin C) in plants. 4. Daily variation of ascorbic acid content and the concentration of carbohydrate in the leaves of plants.  
*Jap. J. Bot.*, 1941, 11: 343-56, bibl. 20 [received 1950].

The relationship between the daily changes in ascorbic acid content and the accumulation of carbohydrates in the leaves of spinach, barley, wheat, broad bean and Chinese cabbage was studied. A positive correlation was observed between the concentration of ascorbic acid and carbohydrates in the leaves. On a fine day the concentration of ascorbic acid fluctuated considerably and was at a maximum in the afternoon. On a wet day the concentration remained fairly stable and was much lower than on a fine day. The amount of ascorbic acid was almost directly proportional to the carbon dioxide concentration of the air. In leaves of spinach, it was generally higher in spring than in summer.—Tokyo Imperial University.

520. HAGIYA, K.  
The damage induced by a late frost at blossoming time. [Japanese.]  
*J. hort. Ass. Japan*, 1948, 17: 115-20, bibl. 11.

This is an account of the damage caused to vegetables in various parts of Fukuoka province by the night frost on 23 April, 1948. The lowest temperature was -0.6° C. The cold wave came suddenly; the day temperatures were rather high with a clear sky and no wind, conditions favourable for frost damage. The damaged crops were those in flower, i.e. radishes,

colewort, wheat, onions, broad beans. It caused the cruciferous plants to drop their pods, from the top on those plants which flowered early, and from the base on those flowering late. The plants which had just come into flower suffered worst; they had been well manured and flowering was delayed. The plants which had not been adequately manured, and flowered early, suffered little injury. In the case of plants flowering at the same time the damage was least on those receiving most manure. Injury was less near rivers than farther away.

521. ISENBERG, F. M., AND ODLAND, M. L.  
**Comparative effects of various organic mulches and clean cultivation on yields of certain vegetable crops.**  
*Progr. Rep. Pa agric. Exp. Stat.* 35, 1950, pp. 10, bibl. 27, illus.

1. A mulching *versus* cultivation experiment with cucumbers in 1948 showed increased yields for mulching. Greater soil moisture content was found under mulches than under cultivation. 2. Experiment No. 1 in 1949 with sweet corn, tomatoes, and sprouting broccoli comparing mulch with clean cultivation showed that mulch increased yields for all crops. Moisture was found to be higher under the mulch than under cultivation. 3. Experiment No. 2 comparing five mulches on tomato found no differences in yield between any of them. In the case of both experiments, N *versus* no N treatment was effective only on broccoli. 4. Weed control Experiment No. 3 comparing mulch plus 2,4-D with clean cultivation on yield of sweet corn, showed no yield differences between treatments, but weed control under mulch plus herbicide was more effective over a longer period of time. 5. Experiment No. 4 on time of mulching tomatoes indicated that both clean cultivation and two cultivations plus mulch produced greater early yields than mulch only or one cultivation plus mulch. Total yield for each of the mulch treatments exceeded that for clean cultivation. [From authors' summary.]

522. JOHNSON, W. A., AND WARE, L. M.  
**Effects of different mulches on soil acidity.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 285-8, bibl. 6.

As part of an experiment to determine the effects of mulches on vegetables, annual measurements of soil acidity were made over 7 years in Alabama on plots that had received various straw mulches, peanut hulls, peat and pine sawdust. The results indicate that although there was some increase in soil acidity it was too slight to make the use of these materials unsafe.

523. GURLEV, A. S., AND PLATONOVA, E. M.  
**The rôle of perennial grasses in developing the structure of hot bed soils.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 65-8, bibl. 1.

Grassland rotation as evolved by V. R. Williams and employed in Russian agriculture is shown to have a beneficial effect on the structure of hotbed soils. Where possible meadow soil should be used for hotbeds, or as an alternative mixed perennial grasses sown in hotbeds, 3-6 months before they are needed for use.

524. SCHMITT, L., AND JUNGERMANN, K.  
**Über die Möglichkeit, die Wirkung der Humuskomponente eines Humusdüngers auf den Pflanzenertrag zu erfassen (II). (The possibility of determining the effect of the humus constituents of a humus manure on plant yields.)**

*Landw. Forsch.*, 1949, 1: 93-9, from abstr. in *Soils and Ferts*, 1950, 13: 1970.

The effects of mineral fertilizers, farmyard manure and the organic manure Huminal were compared in pot trials. The direct influence on the yield of various root and vegetable crops and tobacco over 9 years increased in the order Huminal, manure, NPK. In residual effect, manure and manure+NPK were superior to Huminal and Huminal+NPK. The total effects ran parallel with the total contents of directly and indirectly available N in the various treatments; the organic matter showed no effect on yield.

525. POWERS, W. L., AND JORDAN, J. V.  
**Boron in Oregon soils and plant nutrition.**  
*Soil Sci.*, 1950, 70: 99-107, bibl. 9, being *Tech. Pap. Ore. agric. Exp. Stat.* 585.

Alfalfa, table beets, carrots, and sunflowers are very tolerant to boron; beans and tomatoes are very sensitive. The application for the former crops on medium textured, nearly neutral soils may be 30 to 50 lb. of borax an acre; for potatoes and beans it must be limited to 10. A desirable level of available boron for such soil is 0.5 to 1.0 p.p.m. Soil with an excess of available boron may be improved by drainage and with applications of sulphur and manure and copious irrigation. If this is not feasible, liming may be used to aid solubility and activity of boron present. [From authors' summary.]

526. WIEDE, W.  
**Was vermögen steigende Nitrophoskagaben bei den wichtigsten landwirtschaftlichen Kulturpflanzen zu leisten? (The effect of increasing amounts of nitrophoska on the more important agricultural plants.)**  
*Z. PflErnähr. Düng.*, 1950, 49: 277-90.

Results of field trials for 1927-40, carried out at Ludwigshafen/Rhein are summarized. With all garden and field vegetables, except celery, the equivalent mixtures of single fertilizers were somewhat inferior to Nitrophoska [a proprietary compound NPK fertilizer]. It is stated that root crops respond particularly well to this fertilizer; with the maximum application used, namely that containing 80 kg. N/ha for potatoes and 100 kg. N/ha for beets, potatoes showed a yield increase of 102.8 kg. per ha. for every kg. of Nitrophoska, and beetroot one of 279.1 kg.

527. FRANCO, C. M.  
**A salinidade do solo em canteiros de estufa. (Salinity of greenhouse seedbeds.)**  
[English summary 4 p.]  
*Bragantia*, 1948, 8: 19-24, bibl. 9, illus. [received 1950].

At the Instituto Agrônomo, Campinas, it was observed that many plants developed poorly or even failed to germinate when sown in glasshouse seedbeds which had been used repeatedly without change of soil. Experiments showed that this was due to an increase in



soil salinity, and that heavy flooding restored fertility. Plants of *Phaseolus vulgaris* were found to be more susceptible to the salinity than were soya bean or corn plants.

528. MOORE, W. D., CONOVER, R. A., AND STODDARD, D. L.

The sclerotinose disease of vegetable crops in Florida.

Bull. Fla agric. Exp. Stats 457, 1949, pp. 20, bibl. 8, illus.

This disease caused by *Sclerotinia sclerotiorum* is described in relation to its history in Florida, the organism, weather relationships, crops affected (snap beans, tomatoes, potatoes, celery, lettuce, cabbage and miscellaneous crops), wild hosts, and control by soil treatments, flooding, destruction of wild hosts, removal of infected plants, sprays and dusts, row and drill spacing, crop rotation and pre-cooling before shipping. Chemicals tested all proved to be inadequate for control, and spraying or dusting cannot at present be recommended.

529. HOUTMAN, G.

Over een schadelijke zwam: *Sclerotinia sclerotiorum*. (A destructive fungus: *S. sclerotiorum*.)

Cult. Hand., 1950, 16: 370-2, illus.

The symptoms caused by *S. sclerotiorum* on beans, chicory, tomatoes and tulips are described. The destruction of all affected plants and plant refuse is stressed.

530. MILES, H. W.

Eelworm diseases of horticultural crops.

Reprinted from Meded. LandbHoogeschool, Gent, 1950, 15, No. 1, pp. 25, bibl. 28.

An account of diseases caused by eelworms and of the host plants attacked, life cycles, spread, and control especially by hot water treatment.

531. HIGLEY, J. C.

Root-knot eelworm and its control in the glasshouse.

Gr. Digest, 1950, 2: 1: 18-23.

Control of root-knot eelworm (*Heterodera marioni*) with D-D is described and its economic aspect discussed.

532. LOUISIANA STATE UNIVERSITY.

Truck crop insect control guide.

Agric. Ext. Publ. La Div. agric. Ext. 1046, 1950, pp. 10.

Control measures are tabulated for pests of beans, beets, cabbage and related crops, carrots, cowpeas, cucumbers and related crops (cantaloupes, squash, watermelons, pumpkins), eggplant, English peas, Irish potatoes, okra, peppers, shallots, onions and garlic, spinach, lettuce, parsley, strawberries, sweet corn, tomatoes, turnip, mustard, and radishes. Notes are given on the use of cryolite, DDT, nicotine, paris green, pyrethrum, rotenone, sodium fluosilicate, and sulphur.

533. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The vegetable weevil (*Listroderes obliquus*).

Agric. Gaz. N.S.W., 1950, 61: 371-2, illus.

The larvae of this weevil attack practically all winter

vegetables. Clean cultivation is an important factor in its control. Poisoned baits are recommended, and spraying or dusting with lead arsenate or DDT.

534. LUGENBILL, P.

Habits and control of the fall armyworm [*Laphygma frugiperda*].

Fmrs' Bull., U.S. Dep. Agric. 1990, 1950, pp. 11, illus.

The fall armyworm attacks cereal and forage crops, and in outbreak years damages tobacco, grapes, potatoes, sweet potatoes, turnips, spinach, cabbage and cucumbers. Its life history, natural enemies and methods of control are described.

535. HENDERSON, C. F., KEISER, I., AND BODENSTEIN, O. F.

Effect of certain solvents in DDT emulsions and solutions on plants treated in white-fringed beetle control.

[Publ.] U.S. Dep. Agric. E-806, 1950, pp. 16, bibl. 2.

In trials in 1945, for the control of the white-fringed beetle (*Graphognathus* spp.) on vegetables, Amso-Solv A was the most satisfactory solvent tried for use with DDT. In 1946, satisfactory results were obtained with emulsion sprays applied at rates up to 10 lb. DDT (10 qt xylene) per acre/season to the foliage of various crops and ornamentals.

536. SMITH, F. F., AND FULTON, R. A.

Tetraethyl dithiopyrophosphate in aerosols for the control of greenhouse insects.

[Publ.] U.S. Dep. Agric. E-803, 1950, pp. 10, bibl. 4.

Tetraethyl dithiopyrophosphate in aerosols is highly toxic to spider mites, aphids, white flies, and mealybugs, and relatively low in phytotoxicity. Many cultivated plants (listed) were included in the trials. The preparation and use of the aerosol are described [see also H.A., 20: 2753].

## Brassicas.

(See also 417, 617, 687k, x, 688d, i, k, l, s, 1222, 1232, 1239.)

537. SCHUPHAN, W.

Eine einfache chemische Schnellmethode zur Unterscheidung einiger blauer und grüner Formen von *Brassica-oleracea*-Varietäten in Samen. (Vorläufige Mitteilung.) (A simple and rapid chemical method of differentiating between the seed of blue and green varieties of *Brassica oleracea*. (Preliminary communication.))

Reprinted from Landw. Forschung, 1950 [?], Vol. 2, pp. 5, bibl. 9.

In earlier papers the author discussed the application of spectrophotometrical methods to seed testing (H.A., 19: 1740 and 20: 246). The new method is simpler, but can only be used to distinguish between the seed of red and ordinary cabbage varieties and red and green kohlrabi varieties. The test is based on the colour of the methanol extract after treatment with HCl. In the case of red cabbage the intensity of the colour also makes differentiation possible between fresh and old seed.—Staatsinst. angew. Botanik, Hamburg.

538. FUKUSHIMA, E., TOKUMASU, S., AND OGURO, E.  
**Artificially induced autotetraploid plants in *Raphanus* and *Brassica* vegetables.** [Japanese.]

*J. hort. Ass. Japan*, 1949, **18**: 121-8, bibl. 10.

Comparative studies of artificially induced tetraploids and diploids were carried out on 10 *Raphanus* and 11 *Brassica* varieties. The diploids contained 1.5-2.5 times as many seeds as the tetraploids, but the seeds of the latter were 1.5 times as heavy as those of the former.

539. TURECKAJA, R. H.

**The effect of applying growth substances to seedlings of vegetable plants on their further growth and development.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, **61**: 1109-12, bibl. 1 [received 1950].

Treating cabbage, tomato and beet seedlings, by immersing the root systems in solutions of growth substances before planting out, increased yield of fruit in tomato, size of head in cabbage, and size of root in beetroot. The most effective treatment was  $\beta$ -indolylbutyric acid at 5-10 p.p.m. for 4½-6 hours.

540. KRUŽILIN, A. S.

**The physiology of heat-resistance in cabbage and potato.** [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, **61**: 929-31, bibl. 8 [received 1950].

In heat-resistant varieties of cabbage and potato the retention of water in the leaves during the course of the day is more persistent and the width of the stomatal openings and assimilation are greater, than in non-resistant varieties. Observations on such changes may assist in the physiological appraisal of heat-resistance in those plants. During wilting the water and nitrogen content of the leaves diminishes.

541. BOSWELL, J. G.

**Metabolic systems in the "root" of *Brassica napus* L.**

*Ann. Bot. Lond.*, 1950, **14**: 521-43, bibl. 19.

This is a study of the effects of possible intermediary metabolites on the respiration of root tissue from *Brassica napus* using the Warburg micro-manometric technique. It is concluded that ascorbic acid is oxidized by two systems, one of which appears to be a direct oxidase and the other a dehydrogenase. No evidence of peroxidase activity was secured. A substantial fraction of the total respiratory activity was insensitive to cyanide and azide. The biologically important organic acids were oxidized with the production of carbon dioxide. Glutamic and aspartic acids were metabolized with great rapidity, glycine and alanine much more slowly. A scheme integrating these results is outlined and compared with the respiratory systems existing in potato. [Author's abstract.]—Sheffield University.

542. JANES, B. E.

**Composition of Florida-grown vegetables. II. Effect of variety, location, season, fertilizer level and soil moisture on the organic composition of cabbage, beans, tomatoes, collards, broccoli and carrots.**

*Bull. Fla agric. Exp. Stat.* **455**, 1949, pp. 44, bibl. 63.

Samples of the crops, grown under controlled conditions at a number of branch stations of the Florida Agricultural Experiment Station, were analysed for dry weight, ascorbic acid, carotene, nitrogen, reducing and total soluble sugars, acid-hydrolyzable carbohydrates and acid-insoluble residue. Detailed analytical data are tabulated. In general it was found that the widest variations in composition were associated with location and season. A preliminary attempt has been made to determine the relative importance of the several environmental factors. Soil type had little effect on the organic composition. Soil moisture had a marked effect on moisture content but only minor effects on other constituents. Fertilizer level and variety did influence the composition of crops, but their effect was much less than that of season and location. Length of time required to mature cabbage had little effect on composition. There was a higher dry weight in the lateral shoots than in the apical shoots of broccoli. The carotene content of carrots increased with age. Carrots grown during the cool, short days of mid-winter were lower in carotene than those grown during the warmer, longer days of fall or spring. Owing to lack of data, no direct comparison could be made between the composition of vegetables grown in Florida and those grown in other parts of the country. [For part I of this series, dealing with the mineral composition of Florida-grown vegetables, see *H.A.*, 20: 247.]

543. DENNISON, R. A., AND JANES, B. E.

**Quality of vegetables as related to fertilizer materials with emphasis on potash salts.**

*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 97-9, illus.

Three types of potash, KCl, KNO<sub>3</sub> and K<sub>2</sub>SO<sub>4</sub>, were applied to cabbages and tomatoes at 5% and 10% levels. With cabbage there were no significant differences in yield, but in storage at 47° F., cabbage from plots receiving KCl maintained the best quality. With tomatoes the K plots yielded 452 bushels per acre compared with 341 bushels where no K was applied, there being no difference between the different types of K or the two levels; in shipping and handling tests, the highest percentage of marketable fruits came from plots that had received K<sub>2</sub>SO<sub>4</sub>, the lowest from plots without K or with KCl. A machine designed to simulate shipping and handling conditions is described.

544. ANON.

**Boron deficiency of vegetable crops.**

*Agric. Gaz. N.S.W.*, 1950, **61**: 403-5, illus.

The symptoms of boron deficiency are described with the aid of illustrations for cauliflower, sprouting broccoli, cabbage, swede turnip, beetroot, and celery. There is evidence that the symptoms are more severe in land to which lime has been applied than on similar unlimed land. For most crops and soils, applications of 10 to 30 lb. borax per acre are advised. Where the soil is neutral or alkaline in reaction the amount of borax needed is greater than where the soil is acid.

545. MORGAN, C. N., AND HENDERSON, A. F. C.

**Whiptail in cauliflowers.**

*Qd agric. J.*, 1950, **70**: 338-41, illus.

Whiptail due to molybdenum deficiency is of common occurrence in cauliflowers in the market garden areas of southern Queensland. Symptoms, which vary with



the age of the crop and intensity of the disorder, are described. In trials at the Redlands Experiment Station, marked varietal differences in susceptibility have been found; of 7 varieties, 3 completed normal development, 1 showed mild symptoms, and 3 showed severe symptoms, one failing to produce any heads. On acid land liming may give control, but where this fails the disorder can be cured by applying ammonium molybdate at  $\frac{1}{10}$  oz. in 1 gal. water per square yard of seedbed or at 1 lb. in 40 gal. water per acre in the field.

## 546. POPOVA, E. M.

**Ripening of cabbage seeds.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 15-17, illus.

Results of experiments over 3 seasons with field ripening of cabbage seed show that outdoor ripening was in every case, irrespective of weather, superior to indoor, i.e. loft ripening. Time of ripening was shorter, percentage germination of seeds higher and the detection of variance in the quality of seeds of alternaria-infected plants easier. Seed plants were cut when turning yellow and were ripened by the espalier method.

## 547. LARSON, R. H., MATTHEWS, R. E. F., AND WALKER, J. C.

**Relationships between certain viruses affecting the genus *Brassica*.**

*Phytopathology*, 1950, 40: 955-62, bibl. 14, illus.

The positive serological results obtained in precipitin tests are evidence that the cabbage black-ring virus, cabbage virus A, cabbage black-ring-spot virus, and horseradish mosaic virus are all serologically related.—Univ. of Wisconsin.

## 548. SCHEFFER, R. P.

**Anthraxnose leafspot of crucifers.**

*Tech. Bull. N.C. agric. Exp. Stat.* 92, 1950, pp. 26, bibl. 16, illus.

The host range of *Colletotrichum higginsianum*, the cause of anthracnose leafspot of crucifers, includes in descending order of susceptibility, Chinese cabbage, turnip, "mustard", radish, broccoli, rutabaga, kale, brussels sprouts, kohlrabi, cabbage and collard. No resistant turnip or Chinese cabbage varieties have been found. Southern Giant Curled mustard is highly resistant. Under field conditions, Dithane Z-78, Fermate, Zerlate and Spergon gave significant control.

## 549. ARSENJEVA, M. V.

**Rootrot and cabbage phomosis.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 24-5.

Phomosis, dry rot or canker, caused by the fungus *Phoma lingam*, a wound parasite, attacks both growing and stored plants. The symptoms of the disease on cabbage and root crops are described. Recommended control measures are: (1) Grassland rotation with only one cruciferous crop in 3-4 years; (2) seed treatment with hot water at 50° C. for 25 min.; (3) selection of plants before winter storage and again before

planting out in the spring for seed production; (4) favourable storage conditions, and (5) spraying seed plants with 1% bordeaux mixture before and after flowering.

## 550. AUGER, R.

Les plantes de grande culture de la famille des crucifères. Animaux parasites et maladies parasitaires. Moyens de lutte. (The principal cruciferous crops; their pests and diseases, with notes on control measures.) *Thèse Fac. Pharm. Univ. Strasbourg* 361, 1945, pp. 155, bibl. 13, illus. [received 1950].

The plants described include rape (*Brassica napus*), turnip (*B. campestris*), mustard (*B. nigra*), cabbage (*B. oleracea*), rutabaga, cauliflower and radish. Their cultivation is described with information on yields, composition, etc., a chapter on the sauerkraut industry, and notes on their pests and diseases.

## 551. BÖHM, H.

Beitrag zur Bekämpfung des Mauszahn-rüsslers (*Baris chlorizans* Germ. und *Baris laticollis* Mrsh.). (The control of weevils on cabbage.) [English summary 11 lines.] *PflSch. Ber. Wien*, 1950, 4: 99-105, bibl. 5.

In 1948 mass incidence of the two species *Baris chlorizans* and *B. laticollis* on young cabbage plants was reported from a cabbage growing district in Austria, the losses caused by the pests amounting to 80% in some cases. Laboratory and field trials showed that 2-3 applications of BHC of the ester of thiophosphoric acid gave economic control, while 4 dustings with either of the two insecticides at 8-day intervals completely controlled the pest on seed plants. DDT merely had a repellent effect.—Bundesanst. f. Pflanzenschutz, Vienna.

## 552. CARLSON, E. C., LANGE, W. H., Jr., AND SCIARONI, R. H.

**Brussels sprouts seed loss in California caused by the cabbage seed pod weevil.**

*J. econ. Ent.*, 1950, 43: 389-90, bibl. 2.

Fair to good control of the cabbage seed pod weevil, *Ceutorhynchus assimilis*, was obtained with BHC and lindane applied immediately after seed pod development had started.

## 553. DILLS, L. E., AND ODLAND, M. L.

**Insecticide tests with cabbage caterpillars.**

*J. econ. Ent.*, 1950, 43: 384-5, bibl. 6.

Additional trials [see *H.A.*, 19:3111] on cabbage infested with imported cabbage worm, *Pieris rapae*, cabbage looper, *Trichoplusia ni*, and diamond back moth, *Plutella maculipennis*, with 8 selected materials are reported. Best results were obtained with dieldrin, DDT, and dichlorodiphenyl dichloroethane.

## 554. WALTHER, R.

Bekämpfung von *Tropinota hirta* mit E 605 forte. (The control of *T. hirta* with E 605 f.) [English summary 4 lines.]

*Höfchen Briefe*, 1950, 3:4: 3-5, bibl. 6.

In 1948 and 1949 the beetle *Tropinota hirta* caused

severe damage to brassica seed plants in the Erlangen area, Germany. Repeated applications of E 605 f during the feeding period controlled the pest successfully. In order to avoid injury to bees, spraying was carried out in the evening.

# 555. KÜHNE, H.

Die physiologischen Veränderungen einiger Wertstoffgehalte der Kopfkohlarten (*Brassica oleracea* L.) während der Winterlagerung im Mikro-Lagerungsversuch. (The physiological changes in valuable constituents of cabbages occurring during winter storage.) *Züchter*, 1950, 20: 226-53, bibl. 51.

Ten heads each of the cabbage, red cabbage and savoy varieties under investigation were stored in a cellar and sectors were cut out from time to time for analysis, the cut surfaces being immediately sealed with paraffin wax. This method made it possible to study changes in composition within the same specimen. The results obtained may be divided into 2 groups: I. (a) Winter varieties stored better than autumn varieties, which was found to be chiefly the result of genetically controlled enzyme activity. The state of maturity at harvesting also had some influence on storage life. (b) Some late autumn varieties contained greater amounts of vitamin C than winter varieties. Where storage is intended for short periods only, preference should therefore be given to the former. (c) In cabbage and red cabbage a positive correlation was found between dry matter content and keeping quality during winter storage. (d) No conclusions as to storage quality may be drawn from the shape of the head, but the evidence suggests that coarse veins are an indication of good keeping quality. II. The analytical data justify the following conclusions: (a) Relative and absolute vitamin C losses are smaller in winter than in autumn varieties. No relationship exists between vitamin C retention and storage temperature or changes in other constituents, such as total N, protein N, ash and fibre. (b) A negative relationship exists between dry matter and vitamin C content. (c) At the end of March the following values were obtained for vitamin C content: winter varieties of cabbage, 44 mg. %; savoy, 45 mg. %; and red cabbage, 61 mg. %. (d) The decrease in total N and protein N content was also greater in autumn than in winter varieties.—Hamburg Univ.

# 556. MAEKAWA, T., AND MYODO, M.

On the plant hormone prepared from *Brassica campestris* meal. [Japanese.] *J. hort. Ass. Japan*, 1948, 17: 9-21, bibl. 18, illus.

The writer has extracted 100-200 mg. of plant hormone from 200 g. of "mature" rape seed oil waste, commonly used as a liquid manure, which is thus a very rich source of growth hormone. Positive results were obtained with the hormone in accelerating growth of oats and peas, controlling bud growth, inducing callus development, and controlling root growth. From the results of the trials it is thought that the hormone is  $\beta$ -indoleacetic acid. When using rape seed oil waste as a manure, it must be realized that the hormone itself has some effect in the general result obtained.

# Celery.

(See also 544.)

557. PAWAR, S. S., AND THOMPSON, H. C. The effect of age and size of plant at the time of exposure to low-temperature on reproductive growth in celery. *Proc. Amer. Soc. hort. Sci.*, 1950, 55: 367-71, bibl. 1, being *Pap. Dep. Veg. Crops*, Cornell Univ. 320.

The environmental and other factors that influence the development of the seed in celery were studied in a series of experiments at Cornell University. Seedlings ranging from 14 to 84 days old were subjected to 4 to 6 weeks at 50° F. compared with 60 to 70° F. for the controls. Even the youngest plants responded to the cold treatment by earlier flowering, although they took a much longer time to flower than did the older plants. That this difference was not merely due to differences in size was shown in a further trial, in which plants of different sizes, but of the same age, showed no significant differences in time of flowering after treatment. In two additional experiments defoliation of plants and root pruning prior to the cold treatment also had no effect on flower stalk formation, though root pruning after treatment did have a slight delaying effect. The evidence therefore suggests that age of the plant rather than size is the important factor in the time of development of the reproductive phase.

# 558. WYLIE, W. D.

Tests of new insecticides for the control of aphids on celery in the Everglades. *Bull. Fla agric. Exp. Stat.* 446, 1948, pp. 28, illus. [received 1950].

DDT emulsion appears to be the most satisfactory celery aphicide of any of the materials tested; it is also valuable for reducing injury caused by cutworms.

# 559. ALLEN, W. R., AND BERCK, B.

DDT residues on celery resulting from dust treatments for control of the tarnished plant bug. *Sci. Agric.*, 1950, 30: 375-9, bibl. 6, being *Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa*, 2681.

The distribution of DDT residues on plants dusted with 3 concentrations of DDT to control *Lygus oblineatus* in Manitoba was determined. The residues increased with the rate of application and were found to be greater at the bases of the leaf stalks than at the distal ends; deposits increased peripherally from the heart. Removal of the outermost leaves at harvest and commercial washing both reduced DDT residues markedly.

# 560. BRUNK, M. E.

An economic study of celery marketing. Part I. Harvesting methods. Part II. Packaging methods. Part III. Distribution and selling. *Bull. Fla agric. Exp. Stat.* 445, 1948, pp. 183, illus. [received 1950].

A detailed analysis of the methods of harvesting, packing and selling celery as practised by about half the firms handling celery in Florida. New techniques and devices which facilitate harvesting and packing are described, some of which have already been adopted.



*Cucurbits.*

(See also 74, 687c, g, u, 688j, 1227, 1237.)

## 561. GREBENŠČIKOV, I.

Zur Kenntnis der Kürbisart *Cucurbita pepo* L. nebst einigen Angaben über Ölkürbis.  
(The pumpkin species *C. pepo* with special reference to the oil pumpkin.)

Züchter, 1950, 20: 194-207, bibl. 77, illus.

Following an introduction, in which the characteristics of *C. pepo* are defined in relation to some other *Cucurbita* spp., a classification of the many varieties of *C. pepo* is proposed according to the length of the main shoot, this character being closely associated with the general growth habit of the plant. Forms with a main shoot exceeding 3 m. in length are classed as *longicaules* and forms with shoots under 3 m. as *brevicaules*. The latter group comprises the oil pumpkin, *C. pepo* var. *oleifera*, the cultivation and the seed oil of which are discussed in some detail. Other subjects dealt with are the origin and the genetics of *C. pepo*. The species and variety descriptions are based on the *Cucurbita* collection grown at the Inst. f. Kulturpflanzenforschung at Gatersleben, nr. Quedlinburg, Germany.

## 562. REINECKE, V.

Watermelons and sweet melons (spanspek).

Fmg S. Afr., 1950, 25: 282, 287.

Brief notes are given to South African growers on the soil requirements, sowing and cultivation, harvesting, varieties and insect pests of these crops. In the Transvaal the production of melons is chiefly concentrated in the frost-free areas, where early development of the plants is not retarded by fluctuating climatic conditions. The high summer rainfall may also be a limiting factor to production.

## 563. H., B.

Japanese seedless watermelon.

Seed World, 1950, 67: 9: 12, illus.

A seedless watermelon is described, originally raised in Japan by a hybridization process, in which one parent was a colchicine-induced tetraploid. Only a few undeveloped and edible seeds remain in the flesh of the melon. Except for being "seedless" the melons resemble the normal fruit of the variety from which they originate.

## 564. ČERNETČENKO, V. C., AND TKAČENKO, F. A.

Inter-variety pollination—an effective way of increasing yields in cucurbits. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 7, pp. 55-8.

Hybrid seeds of melons and water melons are shown to produce higher yields and better quality fruits than the parent varieties. However, not all varieties are suitable for hybridization, and a table showing successful crosses, carried out in the Ukraine and at Dnepropetrovsk, is supplied. The method of hybrid seed production is described.

## 565. V. SPRONSEN, A. C.

Belichtingsproef bij komkommers. (Illumination trials with cucumbers.)

Meded. Proefst. Groent. Fruit. Glas., 1950, No. 3, p. 1.

Cucumber plants sown on 5 December were given extra

illumination (midnight to 9 a.m.) from 16 December to 3 January with high pressure mercury lamps and T.L. lamps. On dark days they were also illuminated during the day. Illumination induced considerably earlier cropping, the mercury lamps having more effect than the T.L. lamps. Plants directly under the mercury lamps produced nearly 4 more fruits each than the controls, those about 1.5 m. from the lamps produced 2 more fruits each. After planting out, some of the illuminated plants were sprayed with sugar solutions; this treatment resulted in a further increase in yield of 3 fruits per plant. Extra illumination after planting out retarded cropping.

## 566. ALLO, A. V.

Saving of pumpkin and kumikumi seed.

N.Z. J. Agric., 1950, 80: 171, illus.

Notes are given on cleaning and drying the seed. A good crop of kumikumis [a form of vegetable marrow] will give 350 to 400 lb. of seed per acre, which at the rate of 3s. per lb. yields a good return.

## 567. WALKER, M. N., AND WEBER, G. F. (revised by PARRIS, G. K.).

Diseases of watermelons in Florida.

Bull. Fla agric. Exp. Stat. 459, 1949, pp. 46, illus.

Descriptions are given, with control measures, of anthracnose (*Colletotrichum lagenarium*); wilt (*Fusarium oxysporum* f. *niveum*); downy mildew (*Peronosplasmopara cubensis*); gummy-stem blight (*Mycosphaerella cucumis*); stem-end rot (*Phyalospora rhodina*); southern blight (*Corticium rolfsii*); blossom-end rot (*Pythium debaryanum* and other fungi); powdery mildew (*Erysiphe cichoracearum*); cercospora leaf spot (*Cercospora citrullina*); macrosporium leaf spot (*Macrosporium cucumerinum*); soft rot (*Corticium vagum*); speckle (cause unknown); mosaic (virus transmitted by *Aphis gossypii*); minor diseases, and cold wind and sand injury.

## 568. PARRIS, G. K.

Cucurbit mildews in Florida.

Circ. Fla agric. Exp. Stat. S-I, 1949, pp. 6, illus.

Descriptions of downy mildew (*Peronosplasmopara cubensis*) and of powdery mildew (*Erysiphe cichoracearum*) on cucurbits, with notes on control.

## 569. DOOLITTLE, S. P., AND BEECHER, F. S.

Transmission of downy mildew of cucumber by the spotted cucumber beetle.

Abstr. in Phytopathology, 1950, 40: 870-1.

Experimental data indicate that the spotted cucumber beetle, *Diabrotica undecimpunctata howardi* is a factor in the dissemination of cucumber downy mildew, *Peronospora cubensis*.

## 570. EPPS, W. M.

The use of fungicides on downy-mildew-resistant cucumber varieties.

Abstr. in Phytopathology, 1950, 40: 787.

When the mildew-resistant variety Palmetto is interplanted with a susceptible variety the disease may become severe enough for spraying to be desirable. The application of Dithane Z-78 (zineb) gave the best

control under such conditions, followed by Zerlate (ziram) and tribasic copper sulphate.

### Legumes.

(See also 12, 45, 66, 68, 74, 76, 83, 109b, 483, 623, 687b, n, y, 688b, r, 754, 1233, 1237, 1239.)

571. MCGREGOR, W. G., MACLEAN, A. J., AND WALLEN, V. R.

#### Field beans in Canada.

Publ. Canada Dep. Agric. 843, 1950, pp. 16, illus., being *Fmrs' Bull.* 164.

This bulletin, which is a revision of *Pamphl.* 141, deals with the bush or dwarf varieties of the genus *Phaseolus*. The crop is used almost entirely for human food and the majority is processed by the canning industry. Production, varieties, marketing, cultural practices and diseases are discussed.

572. GERVAIS, C.

#### La culture du pois à conserve. (The culture of canning peas.)

Rev. d'Oka, 1949, 23: 66-73, and 1950, 24: 57-67, bibl. in text.

Recommendations to growers of canning peas in Quebec Province on suitable varieties and methods of culture, harvesting and threshing. The information is based mainly on the results of American research.

573. TILKIN, N.

#### L'amélioration du pois de conserve. (Improvement of canning peas.)

Bull. hort., 1950, Vol. 5 (n.s.), No. 2, from abstr. in *Ann. Gembl.*, 1950, 56: 95.

A collection of 208 varieties of canning peas has been made at the Research Station for the Improvement of Fruit and Marketgarden Plants at Gembloux, for purposes of selection and breeding.

574. ONO, T.

#### Colchicine-induced polyploids of *Pisum sativum*. [Japanese—English summary.]

Bot. and Zool., 1940, 8: 1627-31, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (112) [received 1950].

By colchicine treatment polyploids were induced in 3 varieties of pea. They were distinguished from the normal plants by their retarded growth, reduced fertility and large pollen grains.

575. ONO, T.

#### The effects of polyploidy upon morphological and physiological characters in *Pisum sativum*. [Japanese.]

Bot. and Zool., 1940, 8: 1265-74, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (112) [received 1950].

A comparison was made between the normal diploid pea ( $2n=24$ ) and the acenaphthene-induced tetraploid ( $2n=28$ ). Although almost all the organs of the tetraploid plants were larger, the number of stomata, number of pollen grains with full content, and number of seeds in a pod were fewer, the pods shorter and the fertility reduced. The tetraploids were stouter and their flowering period was longer. Parthenocarp occurred frequently. Genetic characters are described.

576. CHOPINET, R., TRÉBUCHET, G., AND DROUZY, J.

#### Essai de classification et d'identification des principales variétés de haricots cultivées en France. (Classification and identification of the French bean varieties grown in France.)

Rev. hort. Paris, 1948, 120: 230-43, 257-65, 307-12, 352-8, 381-6; 1949, 121: 28-9, 55-7, 80-1, 102-3, 131-3, 165-9; 1950, 122: 54-5, 89-90, 119-22, bibl. 19, illus.

The 214 varieties of *Phaseolus vulgaris* treated are arranged in 4 groups and 20 sections, each of which is prefaced by an identification key. The descriptions are supported by plates illustrating the seed of each variety in two positions. Reprints of the paper plus an alphabetical index of varieties are available on application to the Revue Horticole, 26 Rue Jacob, Paris VI<sup>e</sup>. (The first instalments of this paper were noted in *H.A.*, 18: 28421.)

577. IJIMA, T.

#### Morphological differences between kidney beans and asparagus beans. [Japanese.]

J. hort. Ass. Japan, 1949, 18: 202-12, bibl. 26, illus.

The author suggests that the heart shape of the kidney bean leaf indicates that it was originally composed of three leaflets, and considers that previous descriptions should be amended. The asparagus bean (*Vigna sesquipedalis*) has 5 sepals, not 4, and the plant is not smooth but covered with hairs.

578. WELLHAUSEN, L. J., AND OTHERS.

#### Frijol Rocamex 1, 2 y 3. (The French bean varieties, Rocamex 1, 2 and 3.)

Fol. Secr. Agric. Ganad. Mexico 8, 1949, from abstr. in *Bol. inform. Colombia*, March, 1950, No. 5, pp. 16-17.

Three new French bean varieties, bred at the "El Horno" Experiment Station in Mexico, are described. They produce very high yields and are resistant to pests and diseases.

579. KVASNIKOV, B. V.

#### Frost resistance of French bean varieties. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 6, p. 56.

At the Losinoostrov branch vegetable experiment Institute, the following varieties were found to be the most hardy, and are recommended for early sowing: two local varieties, and all strains of Northern Star and of Saxa Stringless.

580. GARESE, P.

#### Efectos de los acidos naftalene acetico y 2,4-diclorofenoxiacetico en "*Phaseolus aureus* y *Ph. vulgaris*". (The effects of alphanaphthaleneacetic acid and 2,4-dichlorophenoxyacetic acid on *Phaseolus aureus* and *P. vulgaris*.) [English abstract 6 lines.]

Reprinted from *De Lilloa*, 19: 29-35, being *Publ. téc. Inst. Bot. Buenos Aires* 45 (n.s.), 1949, bibl. 8.

Seeds of *Phaseolus aureus* and *P. vulgaris* were treated with NAA and 2,4-D solutions, in concentrations of



5, 10, 25, 50 and 100 mg./l., for 24 hours; they were then sown in a greenhouse and the seedlings observed for 23 days. With *P. aureus*, NAA inhibited stem and leaf growth progressively, inhibition being complete at 100 mg./l.; lower concentrations encouraged root production. 2,4-D had a less marked effect on stem growth; it did not stimulate root development and the higher concentrations even inhibited root production. With *P. vulgaris*, both substances inhibited stem and leaf growth, but in this case 2,4-D was the more active. Even the lowest concentration of 2,4-D resulted in malformation of the leaves. NAA again stimulated, while 2,4-D inhibited, root growth.

581. BARTON, L. V.

**Relation of different gases to the soaking injury of seeds.**

*Contr. Boyce Thompson Inst.*, 1950, 16: 55-71, bibl. 14, illus.

Oxygen, carbon dioxide, hydrogen and nitrogen were passed through the water in which seeds of peas, beans and cereals were soaked, and the effect on germination studied. The results confirmed an earlier finding, that oxygen bubbling through the water enhanced soaking injury. They showed further that nitrogen or hydrogen reduced the harmful effects somewhat, while carbon dioxide reduced them still further or prevented them entirely.

582. ZUBKUS, L. P.

**The viability of immature embryos of French beans on nutrient media.**

*Agrobiologija* (Agrobiology), 1950, No. 1, pp. 137-41, illus.

Immature French bean embryos at various stages of development were extracted, placed on nutrient agar, and their further development, if any, noted. The results indicated that viability of such embryos depended not on their size but on the degree of differentiation at the time of extraction. The degree of differentiation is not always in direct relation to the size of the embryo, but is limited by the conditions under which the seed develops.

583. WARREN, G. F.

**Effect of rate and depth of seeding on the yield and maturity of Henderson bush lima beans.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 372-4, bibl. 5.

In Wisconsin in 1947, Henderson bush lima beans were planted in 36-in. rows and 2, 4 and 8 in. apart in the rows. In 1948 they were planted in 30-in. rows and 1, 2 and 4 in. apart in the rows. In both cases the yield increased as the rate of seeding was increased. Comparing depths of sowing there was no difference in yield between 1 in. and 2 in., but a 4 in. depth included in the first year significantly reduced the stand and yield.

584. YOUNKIN, S. G., HESTER, J. B., AND HOADLEY, A. D.

**Interaction of seeding rates and nitrogen levels on yield and sieve size of peas.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 379-83.

In producing processing peas it is equally important to obtain high yields and a low proportion of large peas.

An experiment in Pennsylvania with the variety Deep Green Superlaska is described in which the highest total yield was obtained with a 6-9-9 fertilizer and a 4.4 bushels per acre seed rate, while the highest yield of small peas was obtained with a 0-9-9 fertilizer and a 7.7 bushels seed rate.

585. HESTER, J. B., HOADLEY, A. D., AND SMITH, G. E.

**Fertilizer experiments with processing peas.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 375-8.

Three NPK fertilizer experiments on canning peas in Pennsylvania are described in which responses were obtained to both N and K. The results suggest that generally a ratio approximating to 1-1-1 would be most suitable, and that yields tend to increase with increased applications up to the point at which salt concentrations injure germination.

586. PAGE, N. R., AND PADEN, W. R.

**Differential response of snapbeans, crimson clover, and turnips to varying rates of calcium and sodium borate on three soil types.**

*Proc. Soil Sci. Soc. Amer.* 1949, 1950, 14: 253-7, bibl. 2, being *Tech. Contr. S.C. agric. Exp. Stat.* 169.

Summarized results are given of greenhouse experiments, conducted to study the effects of Rasorite ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 4\text{H}_2\text{O}$ ) and Colemanite ( $\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$ ) applications. The boron content of the leaves increased directly with rate of boron application. In all cases plants absorbed more boron from Rasorite than they did from an equivalent amount of Colemanite. Generally, the green weight of plants decreased as the boron content increased, though neither treatment influenced the yield of turnips. It would seem that larger quantities of boron can be added to heavier soils and to soils having a high organic matter content than to lighter soils, and on the whole Colemanite can be applied in larger amounts than Rasorite.

587. MCCREADY, R. M., AND OTHERS.

**Determination of starch and amylose in vegetables. Application to peas.**

*Analyt. Chem.*, 1950, 22: 1156-8, bibl. 19.

A rapid method for the determination of starch and amylose in peas is described, by which samples as small as a single pea can easily be analysed. Starch is estimated by the glucose-anthrone-sulphuric acid reaction. Amylose is determined by its iodine colour reaction. The accuracy is at least equal to that of other methods and a great saving of time is realized. Analyses of both dried and fresh peas are presented. Wrinkled peas contain about 34% starch of 70% amylose content. Smooth peas contain 44% starch of 36% amylose content. The ratio of amylose to amylopectin in wrinkled pea starches increases as the peas mature. [Authors' conclusion.]—Western Regional Res. Lab., Albany, Calif.

588. KLIMENKO, V. G.

**The nitrogen and nitrogen compounds in some leguminous species. [Russian.]**

*Biohimija* (Biochemistry), 1950, 15: 408-13, bibl. 12.

A biochemical study of the seeds of broad bean (*Vicia*

*faba*), 2 varieties of pea (*Pisum sativum*), 2 varieties of French bean (*Phaseolus vulgaris*), lentil (*Lens esculenta*) and gram (*Cicer arietinum*).

589. MITCHELL, J. W., AND MARTH, P. C.  
Effect of growth-regulating substances on the water-retaining capacity of bean plants.  
*Bot. Gaz.*, 1950, 112: 70-6, bibl. 10, illus.

Experiments conducted at the Bureau of Plant Industry, Beltsville, Md, indicate that 4-chlorophenoxyacetic acid (4-Cl) applied as a spray or dip treatment to attached snap-bean fruits increases water absorption and water-retaining capacity. A physiological explanation of these observations is offered. Application of 4-Cl in a wax emulsion to the attached fruits was more effective in retarding evaporation following harvest than was an equal concentration of the acid in aqueous spray. Fruits sprayed with the 4-Cl—wax mixture retained their original colour longer and appeared to be more turgid after storage than those receiving a wax coating alone. Further investigations will be necessary, however, before the application of 4-Cl can be considered as a practical means of improving storage quality of snap beans.

590. WATANABE, H., AND KUWABARA, T.  
Effects of some environmental factors on flowering and fruiting habits of leguminous vegetables. I. [Japanese.]  
*J. hort. Ass. Japan*, 1949, 18: 213-25, bibl. 27.

A study of the flowering and fruiting of leguminous vegetables in relation to the time of sowing the seed, the dates of sowing being 22 April, 23 June, and 10 August.

591. SUGIYAMA, T., NISHI, S., AND KATO, T.  
Fruiting habit of broad bean. [Japanese.]  
*J. hort. Ass. Japan*, 1949, 18: 138-49, bibl. 6, illus.

Sowings of an early variety of broad bean were made on 28 October, 15 March and 5 April. One part of the October sowing was made in open ground and another in pots inside a glasshouse. The autumn-sown plants had more abundant branches of the first and second orders than the spring-sown plants which had few branches and those of the first order only. In the autumn-sown plants in the open ground the main stem and some of the first order branches withered during the winter; this did not happen in the greenhouse. In the autumn-sown plants the number of flower nodes and flowers was high and the crop good, whereas from the spring sowing the flowers were borne high on the stem and the number of flowers was small. The plants from the April-sown seed hardly ripened. From 23 plants of the March sowing 3, and from 23 plants of the April sowing 19, did not ripen seed at all. On some material from the October sowing, the leaves, the apex and the flowers were removed. The result of plucking the leaves was that the number of branches, flowers and fruit was small. Removing the apex caused the branching to be a little more abundant but the number of flowers and fruit rather less; no increase in the number of pods was observed. Plucking the flowers increased the food supply and made the branches grow longer and branch better; the number of flowers produced subsequently was very high.

592. THOMAS, H. R., AND ZAUMEYER, W. J.  
Red node, a virus disease of beans.  
*Phytopathology*, 1950, 40: 832-45, bibl. 15, illus.

This disease causes reddish discoloured nodes of the stem and pulvini of the leaves and leaflets and reddish concentric ringed patterns on the pods. It was artificially transmitted to a number of plants (mostly leguminous), but no infection was obtained on tomato, *Nicotiana glutinosa*, white clover or alfalfa.—Plant Industry Station, Beltsville, Maryland.

593. ZAUMEYER, W. J., AND THOMAS, H. R.  
Yellow stipple, a virus disease of bean.  
*Phytopathology*, 1950, 40: 847-59, bibl. 14, illus.

This new virus of bean, which distorted Stringless Black Valentine pods in combination with southern bean mosaic and pod mottle virus and was separated from these viruses, is described, identified, and compared with other bean viruses. It produces a mild leaf mottling.—Plant Industry Station, Beltsville, Md.

594. REINKING, O. A., AND NEWHALL, A. G.  
A soil fumigation test for pea root rot control.  
*Phytopathology*, 1950, 40: 879-82, bibl. 4, being *J. Pap. N. Y. St. agric. Exp. Stat.* 813.

From results recorded it is concluded that the control of fusarium root rot of pea by the application of soil fumigants is not practical at present.

595. ANGELL, H. R.  
Seedling blight. II. Soil in relation to seedling blight of opium poppy and peas.  
*Aust. J. agric. Res.*, 1950, 1: 132-40, bibl. 16.

The organism *Pythium ultimum* isolated from germinating peas was pathogenic to both opium poppy and peas. The incidence of the disease on peas in three reinfested, steamed soils, limed and not limed, varied significantly. On poppy, on two of the reinfested soils, it also varied significantly, but inversely to the incidence on peas. On peas in the first sowing it was not affected by liming the soil; on poppy it was significantly reduced. The contrasting results could not be correlated with the uniform conditions of soil temperature, air temperature, and soil moisture; on any one soil or soil treatment they could not be ascribed to the prevailing uniform aeration, reaction, microflora, and microbial antagonism. The only conditioning factor that was varied was the steamed soil, or steamed soil modified by adding lime. Differences in the incidence of disease were associated with variation of the conditioning factor and the host. Seedling blight of peas, resulting from natural reinfestation, occurred earlier in resowings in limed than in unlimed soils. Physiogenic seedling blight of poppy also occurred, causing total loss on one soil and smaller percentages of loss on the other soils. [From author's summary.]—C.S.I.R.O.

596. HALLECK, F. E., AND COCHRANE, V. W.  
The effect of fungistatic agents on the bacterial flora of the rhizosphere.  
*Phytopathology*, 1950, 40: 715-18, bibl. 12.

In preliminary studies, bordeaux mixture, malachite green, and Dithane Z-78 applied to the leaves of bean plants reduced the relative numbers of bacteria in the



rhizosphere. Five other materials tried increased the relative number of rhizosphere bacteria.—Wesleyan Univ., Middletown, Conn.

# 597. LEFÈVRE, P. C.

*Bruchus obtectus* Say ou bruche des haricots (*Phaseolus vulgaris* L.). (The bean weevil, *Bruchus obtectus*.)

Ser. sci. Inst. nat. Ét. agron. Congo belge 48, 1950, pp. 65, bibl. 53, illus., 35 fr.

An account of the bean weevil including descriptions of its life history, host plants, biology, correlation between incidence of adults and the damage caused, evaluation of the damage, and control measures.

# 598. MORALES M., E.

El problema de los brúquidos en Costa Rica. (The problems of bruchids [in stored bean seed] in Costa Rica.)

Suelo Tico, 1950, 4: 140-4.

Preliminary investigations revealed that 3 insect species were responsible for the severe damage being caused to stored beans in Costa Rica. In order of importance these were *Acanthoscelides obtectus* Say, *Zabrotes subfasciatus* Say, and *Callosobruchus maculatus* F. The insects and the damage they cause are described. The seeds are usually infested while still in the field, although the damage only becomes noticeable in store. Hygiene in the store house and in the field is advocated to eliminate sources of infection. Experiments are being planned to determine (1) the depth to which the haulm must be ploughed in to prevent emergence of the adult insects; (2) the period of oviposition; and (3) the best method of chemical control in the field.

# 599. EVERETT, P.

Spread of green vegetable bug.

N.Z. J. Agric., 1950, 80: 145-6, bibl. 3, illus.

The spread of the green vegetable bug, *Nezara viridula* L., in New Zealand is described and shown on a map. The pest feeds on many kinds of vegetables, flowers, fruit, and weeds. Runner beans and tomatoes are among the most favoured host plants. Control measures suggested are: (1) During autumn and winter destroy all rubbish, dead leaves, weeds, etc., where bugs are likely to hibernate. (2) At frequent intervals during spring and early summer collect and destroy all egg rafts and visible bugs. (3) Treat infected plants when necessary with a spray containing  $\frac{1}{2}$  lb. actual DDT in 100 gal. water.

## Mushrooms.

(See also 687w, 1188, 1209.)

# 600. BAUDEWILN, J.

La culture du champignon dans le Limbourg. (Mushroom growing in the Belgian province of Limbourg.)

Rev. Agric. Brux., 1950, 3: 267-84, bibl. in text.

In the province of Limbourg mushrooms are grown in caves on a large scale, but the standards of efficiency are apparently not quite as high as those of some other countries. Data are assembled on the methods and economics of mushroom culture in the Netherlands, England, France and the United States.

# 601. ATKINS, F. C.

White plaster mould.

[Publ.] Mushroom Gr Ass. Yaxley, undated, pp. 12, bibl. 30, illus., 2s. 6d. [received 1950].

An account of the white plaster mould of mushrooms, caused by *Scopulariopsis fimicola*, with suggested control measures.

# 602. ATKINS, F. C.

Verticillium on mushrooms.

[Publ.] Midlands Group Publs, Peterborough, 1945, pp. 52, bibl. 8, illus., 5s. [received 1950].

A disease of cultivated mushrooms, and the causal organism, *Verticillium dahliae*, are described, with control measures by fumigation, spraying, and ventilation.

# 603. BRAUNS, A.

Zur Kenntnis des Schadinsekten an Champignonkulturen. (Mushroom pests.)

Nachr Bl. dtsch. PflSchDienst., Braunschweig, 1950, 2: 153-6, bibl. 28, illus.

Mushroom pests in Germany are considered with particular reference to species of flies (*Sciariidae* and *Phoridae*). Control measures are given.

# 604. NISIKADO, Y., KIMURA, K., AND MIYAWAKI, Y.

Studies on the effect of kinds of tree in culture medium upon the growth of *Cortinellus berkeleyanus*. I. The mycelial growth in pure culture on the sawdust medium prepared of various kinds of tree.

Ber. Ohara Inst. landw. Forsch., 1942, 9: 39-60 [received 1950].

Excellent growth of the Shiitake mushroom (*Cortinellus berkeleyanus*) was obtained on sawdust of the following trees among various species that are commonly used as logs for the culture of the fungus in Japan: *Carpinus carpinoides*, *Petrophiloides strobilacea* and *Cornus controversa*. Recommendations are made for the composition of the medium.

# 605. NISIKADO, Y., MIHASE, T., AND NAKAYAMA, T.

Illustrations and descriptions of fungi injurious to the culture of Shiitake mushroom [*Cortinellus berkeleyanus*]. I and II.

Ber. Ohara Inst. landw. Forsch., 1942, 9: 61-70, and 1943, 9: 252-8, illus. [received 1950].

Descriptions are given of 7 species of *Stereum*, 7 species of *Polyporus* and 2 species of *Polystictus*, and illustrations are presented on 12 plates, 4 of them coloured. Control measures are not discussed.

# 606. NISIKADO, Y., AND MIYAWAKI, Y.

On the relation of temperature and light to the development of sporophores in *Cortinellus berkeleyanus*.

Ber. Ohara Inst. landw. Forsch., 1943, 9: 230-7, bibl. 2, illus. [received 1950].

The culture of the Shiitake mushroom, *Cortinellus berkeleyanus* Ito and Imai, has become increasingly popular in Japan since the introduction of an improved

method of inoculating logs with a pure culture of the fungus. From the studies described here it is concluded that the optimum temperature for the formation of sporophores is in the neighbourhood of 15° C., which is slightly lower than the optimum temperature for mycelial development. The sporophores form equally abundantly in the dark as in the light when the temperature and moisture content are optimum, but there were some differences in morphology and colour between the sporophores formed in darkness and light.

607. WAHL, I.

Cultivation of wild forms of the mushroom *Psalliota bispora* (Lge) Schäffer and Möller.

*Phytopathology*, 1950, 40: 793-8, bibl. 11, illus.

Two morphological types have been distinguished among the wild 2-spored mushrooms of the species *Psalliota bispora*. One has a brown, scaly cap and a short stem, the other a creamy white, fibrillous cap and a long, slender stem. The brown type grew vigorously in manure fermented at high temperatures; it is particularly fertile and fruits about 30 days after spawning.—University Farm, Saint Paul, Minnesota.

608. NISIKADO, Y., AND KIMURA, K.

Principles of artificial propagation of *Tricholoma conglobatum* (Vitt.) Sacc. I. Germination of the spores and the cultural characters of the fungous mycelium.

*Ber. Ohara Inst. landw. Forsch.*, 1942, 9: 29-38, illus. [received 1950].

The edible fungus *Tricholoma conglobatum*, which grows in red pine forests, is very popular in Japan. In order to obtain spawn for propagation in its natural habitat the authors studied the conditions under which the mycelium can be grown in culture, and make suggestions for the most suitable medium and temperature. In a further investigation an explanation is being sought for the phenomenon whereby the fungus usually appears within 2-3 years after burning the soil over with rice straw. There are 4 plates illustrating the fungus, the mycelium and the germination of spores.

*Onions and related plants.*

(See also 453, 482, 512, 687i, s, 688f, g, 1220.)

609. ARNAULT-MARTINÉ, M.

Contribution à l'étude des Liliacées-Alliées. L'ail et les Allium. (Contribution to the study of the Liliaceae-Allioideae. Garlic and the onion tribe.)

*Thèse Fac. Pharm. Univ. Strasbourg*, 1946, pp. 249, bibl. 176, illus. [received 1950].

By far the greater part of this thesis is devoted to garlic. The aspects dealt with are many and varied. A prologue on garlic in history, legend and literature is followed by an account of its botany and culture and a study of its carbohydrates. The next 44 pages are devoted to its culinary value and to traditional or local garlic recipes, and 55 pages to its place in medicine, ancient and modern. Finally pests and diseases, comparatively few, and their control measures are described. The work is both entertaining and informative.

610. MAYER, K.

*Urodinychus karaweiewi* Berl., ein neuer Schädling an Porree. (*U. karaweiewi*, a new pest of leeks.)

*NachrBl. dtsh. PflSchDienst, Berlin*, 1950, 4: 175-6, bibl. 3.

The infestation of leek plants in a frame, 1-2 cm. above ground level, is presumed to have been connected with the presence of an ant colony (*Lasius niger*), which was parasitized by *U. karaweiewi*.

611. NAVARRO B., E.

El cultivo de la cebolla. (The cultivation of onions.)

*Suelo Tico*, 1949, 2: 486-92.

Notes on varieties, methods of culture, harvesting, storage, seed production, marketing and pest and disease control in Costa Rica.

612. PLINKA, A. D.

Ripening of onion seeds.—[Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 17-21, illus.

Results of large-scale ripening tests over 3 years with 4 varieties indicate that field ripening of onion seeds has great advantages over ripening under cover. Early frosts can, however, be a danger to immature seeds in the field, and the following method is suggested for preventing frost damage. A week or 10 days before frost may be expected, all seed plants are lifted with the bulbs, tied into bunches and propped up against the espalier which previously supported the growing seed heads. The access of frost to the seeds in these close bundles is greatly reduced. Frost protection under cover is also considered.

613. ANON.

Diseases of onions.

*Agric. Gaz. N.S.W.*, 1950, 61: 245-6, illus.

Notes are given on downy mildew, white rot and neck rot and on the adverse effects of acid soils. Control measures include steeping seed bulbs in water at 122° F. for 25 minutes, avoiding planting on diseased land, burning diseased bulbs and proper curing before bagging and marketing.

614. ABDULLAEV, S. G.

Downy mildew of onion and its control in Azerbaijan. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 53-4.

Control measures employed include deep ploughing, crop rotation, heat treatment at 40-45° C. of the planting material, wide spacing, not too frequent irrigation, planting resistant varieties and late planting.

615. FOSKETT, R. L., AND PETERSON, C. E.

Relation of dry matter content to storage quality in some onion varieties and hybrids.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 314-18, bibl. 2, being *J. Pap. la agric. Exp. Stat.* J-1702.

In trials in a commercial onion storage house in Iowa in the winter of 1948/49 with 60 onion varieties and hybrids it was shown that the refractive index was positively correlated with, and could therefore be used as a method of estimating, the approximate dry matter percentage. There was also a decided tendency for



varieties with a low percentage of dry matter to sprout more readily in storage than those with a high dry matter percentage, but the standard deviation in this case was too high to permit accurate prediction of storage behaviour in all cases. Determinations of the refractive index of samples at harvest may thus provide a rapid, though rough, guide to the storage behaviour of different varieties.

616. ANON.

**Onions keep well in outdoor hammocks.**

*Grower*, 1950, 34: 669, illus.

A wire-netting hammock is illustrated in which onions stored out of doors in England between 20 October and 31 January with only a corrugated iron sheet as covering compared favourably with bulbs stored under cover in trays.

617. PRIVALOV, A. F.

**Vegetable seed plant storage in trenches.**

[Russian.]

*Sad i Ogorod* (Orchard and garden), 1950,

No. 9, pp. 52-3.

Onion, cabbage, and carrot seed plants overwintered well in 1 m. deep trenches before being planted out in the second year for seed production.

**Root vegetables.**

(See also 58, 65, 91, 93, 481, 512, 539, 542, 544, 549, 586, 617, 710, 1232, 1239.)

618. REES, W. J., AND SKELDING, A. D.

**An inhibitor of salt absorption in root tissue of red beet.**

*Nature*, 1950, 166: 823-4.

A water-soluble substance, which was shown to inhibit the ability of beetroot cells to absorb inorganic salts from solutions, is thought to be connected with the natural dormancy of the plant in winter. So far, the active agent has not been separated from the water-extract.—Birmingham University.

619. SMITH, K. M.

**A new virus affecting mangolds, sugar-beet and related plants.**

*Research, Lond.*, 1950, 3: 434, illus.

Whilst making routine inoculations from mangolds affected with sugar-beet mosaic, an apparently new virus came to light. It is of special interest in that, so far, all attempts to induce it to become systemic in its host plants, including the mangold, have failed, yet, presumably, it must have been systemic in the original mangold plant from which it was first isolated. Large numbers of necrotic lesions are produced on the inoculated leaf. The most susceptible host was found to be red beet; local lesions were also produced on sugar-beet, spinach-beet, mangold, New Zealand spinach, and various other plants including cabbage, broad bean, French bean and several solanaceous plants. Experiments to determine whether the aphids commonly found on sugar-beet and mangolds would spread the virus have so far proved negative. It is not likely that this virus will prove to be of much economic importance, but its properties suggest that it may be of considerable scientific interest.

620. BABB, M. F., KRAUS, J. E., AND MAGRUDER, R.

**Synonymy of orange-fleshed varieties of carrots.**

*Circ. U.S. Dep. Agric.* 833, 1950, pp. 100, bibl. 145, illus.

This circular contains a comprehensive classification and description of orange-fleshed carrots, and lists 389 names that have been applied to varieties or strains. On the basis of their general or outstanding characteristics these varieties or strains have been classified in 9 major groups, as follows: (i) French Forcing; (ii) Scarlet Horn; (iii) Oxheart; (iv) Chantenay; (v) Danvers; (vi) Imperator; (vii) James' Intermediate; (viii) Long Orange; and (ix) Nantes. Field work as a basis for the description and classification of varieties was carried out at the Cheyenne Horticultural Field Station, Wyoming, from 1932 to 1946. An extensive bibliography is quoted including seed catalogues, and numerous clear illustrations are supplied.

621. ALPATOV, V. V.

**Increasing the germinating capacity of seeds with high temperatures and ultraviolet rays.**

[Russian.]

*Priroda* (Nature), 1949, No. 12, pp. 41-3, bibl. 10.

Experiments are described on the effect of high temperature on the germination of seeds of carrot and wheat. In two experiments with carrot seed kept at an air temperature of 70° C. for 30-260 min. and for 60-240 min. respectively, germination was increased from 6.1% (controls) to 9.7%, and from 16.3% to 18.8%. The effect of ultraviolet rays is briefly mentioned. It is said that exposure for 5-10 min. increased germination, but that longer exposures were detrimental.

622. LAMPRECHT, H., AND SVENSSON, V.

**Karotinhalten i morötter och dess beroende av olika faktorer. (The carotene content of carrots and its relation to various factors.)**

[English and German summaries 2 pp. each.]

*Agri hort. Genet.*, 1950, 8: 74-108, bibl. 13.

As a result of 7 years' investigations at the Plant Breeding Institution, Weibullsholm, Landskrona, the chief varieties of carrots grown in Sweden are classified into 5 groups according to their carotene content. It was found that different strains of the same variety could show even greater differences in carotene content than the different varieties. No correlation could be found between carotene content on the one hand and mean weight and dry matter content on the other. A positive correlation, however, was found between yield of carotene and (a) yield of mass, (b) colour of roots. Roots with a light colour of marrow, or of cortex and marrow, had a lower carotene content than those with a red colour. The carotene content of the marrow was always lower than that of the cortex. During the first 4-7 weeks of growth, the carotene content of the roots increased very slowly, it then rose rapidly and finally followed an asymptotic curve, nearly parallel to the abscissa. Earliest sowing gave the highest carotene content, the value steadily decreasing as the date of sowing was delayed. Carrots grown in the central or northern regions of Sweden had a lower carotene content than those grown in the south.

Preliminary investigations into the effect of soil conditions indicated that sandy soils with a good humus content produce a higher carotene content than pure sands or peats. Generally the quantity of carotene in the roots does not change during storage. Under certain conditions, however (when the dry matter content is low), it may decrease considerably.

623. LE RICHE, F. J. H., AND MOUTON, J. A.  
Studies on the processing of vegetables VI.  
1. The chemical composition of some western Cape Province carrot varieties.

LE RICHE, F. J. H., AND BURGER, I. J.  
Studies on the processing of vegetables VI.  
2. Ascorbic acid losses in green peas during canning.

*Sci. Bull. Dep. Agric. S. Afr.* **287**, 1948, pp. 6, bibl. 9 [received 1950].

In the first paper the results of analyses for vitamin C, provitamin A and minerals of a number of varieties and selections of carrots are presented. Great variation in carotene content was found in different strains of the same variety, Cape Market 48843, Chantenay C and Nantes 41543 giving the highest values. No correlation was observed between carotene content and the depth of colour of the cortex. The second paper includes data on the vitamin C content of 7 varieties of green peas.

624. AGAPOV, S. P.

After harvest field drying of seed plants and ripening of seeds of root vegetables.  
[Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 13-14.

Three methods of field drying seed crops of carrot, beetroot, radish, and turnip are described: (1) Drying on espaliers; immediately after harvest, poles are set up 3-4 m. apart, in rows 1.5-2 m. apart, string is tied between the poles along the rows and the seed plants are propped up against the string. (2) Seed plants are cut with a 25 cm. stump and 2 plants are propped up against each other. (3) Six to 8 cut plants are tied together and 4-5 bunches are heaped in a stook. Threshing follows immediately the seed is dry in each case.

625. FLEMION, F., AND OLSON, J.

*Lygus* bugs in relation to seed production and occurrence of embryoless seeds in various umbelliferous species.

*Contr. Boyce Thompson Inst.*, 1950, **16**: 39-46, bibl. 12.

Of the various insects, such as *Lygus* bugs, stinkbugs, flea beetles and cucumber beetles, tested at the Boyce Thompson Institute on umbelliferous plants, only the tarnished plant bug (*Lygus oblineatus*) produced embryolessness. This condition caused by the *Lygus* bug on carrots and dill has been previously reported [see H.A., 19: 2098-9], and further evidence is presented to show that feeding by *Lygus* bugs also resulted in the natural occurrence of embryolessness in fennel, coriander, goutweed, celery, parsnip and parsley. *Lygus* bugs present during and immediately after flowering have been found greatly to reduce total seed yields in this family.

626. MJAZDRIKOVA, M. N.

The effect of "phytoncides" on stored carrots. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 51-2.

As a result of the emanation of antibiotic substances, carrots sprayed with, or soaked for 10 min. in, onion or pine needle extract solution before storage showed a lower percentage of *Sclerotinia*, *Botrytis* and *Alternaria* infection than the untreated controls.

627. BEATTIE, J. H., AND TATMAN, E. C.

Long-term storage of parsnip seed.

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 435-7, bibl. 3.

Storage experiments at the Plant Industry Station, Beltsville, Md, with seed of the variety Hollow Crown indicate that parsnip seed with a moisture content of 4% or less may be kept in sealed containers, placed in cold storage at 20° or 40° F., for at least 6 years without loss of germination capacity or seedling vigour.

628. HAGIWARA, J., KAGEYAMA, M., AND HIR-AOKA, T.

Differences in germination between oil-coated and untreated radish seeds in soils of various moisture content. [Japanese.]

*J. hort. Ass. Japan*, 1949, **18**: 187-8.

Plots of soil with 14, 18, 26 and 30% moisture were used for testing oil-coated and untreated radish seed. Untreated seed germinated under drier conditions than did the oil-coated seed. The oil coating prevents the seed from germinating during dry seasons before sufficient rain has fallen to maintain growth.

### Salad crops.

(See also 687o, 710, 1226, 1237.)

629. DUCRET, G.

Le forage de l'endive à l'électricité en Ile-de-France. (Forcing chicory by electrical soil heating in the Ile-de-France.)

*Rev. hort. Paris*, 1950, **122**: 179-81, illus.

In the Ile-de-France, where chicory forcing is an important industry, a portable electric frame for soil heating is being widely used. An enquiry made into growers' practices shows that: (1) the top wire of the frame should be about level with the base of the root, (2) the temperature in the trench should be brought to 18° C. as quickly as possible and then gradually lowered to reach 14-15° C. 3-5 days before harvest, and (3) the trenches should be covered by 15-20 cm. of pressed straw, then by a 15-20 cm. layer of horse manure which in its turn is covered by sacking and mats. Drawings and photographs illustrate the installations and practices discussed.

630. ATKINSON, R. M., DICKINSON, D., AND HARRIS, F. J. T.

Arsenical contamination of chicory during drying.

*J. Sci. Food Agric.*, 1950, **1**: 264-6, bibl. 3.

Because of the construction of the kilns in which chicory is dried, the chicory is liable to contamination by arsenic in the coke used for the drying. The average arsenic content for single-dried chicory has been found to be slightly over 1 p.p.m. As. There is no great



risk to the consumer, however, for part of the arsenic is lost in the roasting and grinding processes and part is insoluble. [From authors' conclusions.]

631. (VANDERWALLE (R.))

Les principaux ennemis de la chicorée witloof. (Diseases and pests of chicory.) [English summary 14 lines.]

Rev. Agric. Brux., 1950, 3: 832-42, illus.

The principal disease is a *Sclerotinia* collar rot, caused by *S. sclerotiorum* or *S. minor*, against which there exists only one not always entirely successful control measure, viz. soil sterilization by chemical means or heat. Crop rotation, the application of organic manure and of a balanced fertilizer avoiding any excess of phosphates are among the precautions chicory culture requires. Two flies, *Napomyza lateralis* and *Ophiomyia pinguis*, are the most important pests and can be controlled by DDT, BHC or E605 before oviposition and by hot water treatment of the roots at 40° C. for 90 minutes. DDT or BHC are also effective against the beetle *Tanymecus palliatus*.

632. KNOTT, J. E., AND DYER, P. R.

The relationship of certain elements to the yellowing of the basal leaves of lettuce.

Proc. Amer. Soc. hort. Sci., 1950, 55: 358-66, bibl. 11, illus.

A thickening and yellowing of the lower basal leaves, and sometimes of the whole plant, of lettuce is common in the spring months in parts of California. Experiments are described involving applications of Mg, Mo and Na, but there were no responses. Spectrographic analyses of the leaves of yellowing and green plants showed no significant differences between the following elements: Mg, Ca, Si, Na and K, which were present in abundance; Fe, Al, Ti, Mn, Cu, Ba, Sr and P, present in fair quantities; and B, Cr, Mo, Zn, Bi, V and Ni, present in traces. The suggestion that Mg deficiency might be responsible is therefore discounted.

633. GROGAN, R. G., AND BARDIN, R.

Some aspects concerning seed transmission of lettuce mosaic virus.

Abstr. in *Phytopathology*, 1950, 40: 965.

Lettuce mosaic, which causes considerable damage in the commercial lettuce crop of the central coastal area of California, was seed-borne in all commercial seed lots which have been tested.

*Spinach.*

(See also 687b.)

634. ANON.

Zaadhoeveelhedenproef bij Reuzen Cavallius Spinazie. (A sowing trial with the spinach variety Reuzen Cavallius.)

Meded. Proefst. Groent. Fruit. Glas, 1950, No. 1, pp. 2-3.

Spinazie. (Spinach.)

*Ibidem*, 1950, No. 2, p. 2.

Seed of this new variety at 4 oz. per 14m<sup>2</sup> gave the most satisfactory stand of plants when sown in December under glass. It was ready for cutting a week earlier than the Broadleaved Summer variety, but was slightly more susceptible to frost. It has given very good results when grown in a heated glasshouse.

635. GERM, H., AND KIETREIBER, M.

Zur Keimprüfung von Spinatsamen (*Spinacia oleracea* L.). (Testing the germination capacity of spinach seed.)

Bodenkultur, July 1950, 1st Sonderheft, pp. 22-6, bibl. 6.

As a result of experiments, carried out at the Vienna seed testing station, the following conditions were found best for testing germination of spinach seed: A constant temperature of 10° C.; germination in sand of very low moisture content (16% of the field capacity of the quartz sand used); first germination count after 8 days; conclusion of the test after 21 days. As long as the rules require that seeds be tested under optimum conditions—a principle which appears to be of doubtful value, as the authors point out—these conditions should be generally adopted for testing spinach seed.

636. HAGIYA, K.

Studies on the delayed germination of spinach seed. [Japanese.]

J. hort. Ass. Japan, 1949, 18: 198-201, bibl. 10, illus.

Germination tests were carried out with seed of western and of Japanese varieties of spinach, some of the seed with husks retained, others with husks removed; some previously soaked, others not soaked; changing the moisture rate; cutting or perforating the husk. It is concluded from the results that the low moisture content of the husk is responsible for delayed germination. The germination from cutting the husk was 73% and from perforating the husk at the root end 95%.

637. FULTON, J. P.

Studies of strains of cucumber virus I from spinach.

*Phytopathology*, 1950, 40: 729-36, bibl. 7, being *Res. Pap. J. Ser. Ark. agric. Exp. Stat.* 927.

Six isolates of cucumber virus 1 obtained from field-grown spinach produced varying symptoms on selected host plants (including tomato, tobacco, garden bean and garden pea). The resistance of Old Dominion and Virginia Savoy spinach to five of the virus strains was demonstrated.

*Sweet corn.*

(See also 484, 687d, f, p, 1227, 1232.)

638. KIESSELBACH, T. A.

The structure and reproduction of corn [*Zea mays*].

*Res. Bull. Neb. agric. Exp. Stat.* 161, 1949, pp. 96, bibl. 102, illus.

A comprehensive summary of available information on the structure and reproduction of the corn plant, *Zea mays*. In view of the wide interest in the reproductive process connected with breeding and genetics, the floral development, fertilization and embryology are especially stressed. The morphology and development of the vegetative organs are also included, and the botanical relationship, origin, genetics and breeding of corn are briefly considered. A general review of the literature is not given, but many of the pertinent papers are cited, and some original data are presented.

639. WARE, L. M., AND JOHNSON, W. A.  
**Effects of irrigation and other practices on sweet corn.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 416-22, bibl. 3.

Experiments carried out in Alabama over 4 years, growing sweet corn in field bins 1/320 acre in size, are described. In two years of unfavourable rainfall irrigation increased yields, but yields were not increased in two years of favourable rainfall. Animal manure at 6 and 12 tons per acre and ploughed-in rye green manure, but not vetch green manure, significantly increased yields in all years. Increases in yields from irrigation and applications of organic materials were higher when these were used in combination than when they were used separately. Effects tended to be cumulative. Yields increased as applications of fertilizer (1,000, 1,500 and 2,000 lb. per acre of 6-10-4), organic manure and irrigation were successively added. In general the percentage and weight of marketable ears was increased by treatments that increased the number of marketable ears.

640. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, U.S.D.A.  
**Corn earworm (*Heliothis armigera* (Hbn.)).**  
*Pict. Sheet U.S. Dep. Agric.* **11**, revised 1950, pp. 2, illus., 5 cents.

Sweet corn can be protected by spraying with DDT-white mineral oil emulsions, using methods described in this leaflet.

641. BACON, O. G.  
**Control of corn earworm on sweet corn in Northern California.**  
*J. econ. Ent.*, 1950, **43**: 364-71, bibl. 2.

Results have shown that of many insecticides tested DDT is the most effective for controlling the corn earworm, *Heliothis armigera*. Sprays and dusts have proved to be more effective than aerosol applications. To ensure satisfactory control it is necessary that the insecticide impregnates the silk mass and penetrates the silk channel. While only small amounts or no DDT residue was found on the edible portion of the ear, larger quantities shown to be present on the husks and silks render plants treated with DDT undesirable for fodder for milk or meat producing cattle.

### *Sweet potatoes.*

(See also 687j, 688c, 1227, 1241.)

642. HERNANDEZ, T. P., MILLER, J. C., AND FOUNTENOT, J. F.  
**Studies of plant production of sweet potatoes including the effects of chemical treatments.**  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 423-6, bibl. 5.

Two experiments in Louisiana are reported. (1) Roots of 15 industrial type varieties received similar storage treatment during the winter and were bedded on 21 February, 1949. In four pullings of plants wide variations in numbers of plants were shown ranging from nil in seedling L-197 to 3,968 plants per 50-lb. bushel of roots in L-231. (2) Roots of Unit I Porto Rico were dipped or soaked in several concentrations of the amine salt of 2,4-D, Semesan Bel and Spergon.

All the treatments except those involving Semesan Bel and the lowest concentration of 2,4-D (2.6 p.p.m.) gave increased numbers of plants in 4 pullings over the controls, but the differences were not significant except for the highest 2,4-D concentration (10 p.p.m.).

643. MARTIN, W. J.  
**Internal cork of sweet potatoes in Louisiana.**  
*Abstr. in Phytopathology*, 1950, **40**: 789.

Over a period of 3 years at Baton Rouge, La, only one of the 10 lots of sweet potatoes that originated in 1947 from plants with ring-spotting of leaves produced crops of cork-affected potatoes, although lots originating from roots with definite cork symptoms consistently produced crops of cork-affected potatoes. It would appear that two causative agents may be involved in the production of ring spots on the leaves and corky spots in the roots. Neither agent was destroyed by heat treatments of mother potatoes and vine cuttings.

644. MCCLURE, T. T.  
**Anatomical aspects of the *Fusarium* wilt of sweet potatoes.**  
*Phytopathology*, 1950, **40**: 769-75, bibl. 6, illus.

The anatomy of healthy sweet potato plants is compared with that of plants infected with *Fusarium oxysporum* f. *batatas*. Where the stele is infected, normal callus formation is suppressed at the basal wound of a sprout. An auxiliary xylem is often found in infected plants, developing centripetally from an internal cambium. This development of new cells internal to the stele may be the cause of the stem splitting commonly found in infected plants. The mode of spread of the fungus in the plant and the reactions of the plant to it are described.—Univ. of Calif.

645. COOLEY, J. S., AND HASKELL, R. J.  
**Preventing black rot losses in sweetpotatoes.**  
*Leaf. U.S. Dep. Agric.* **280**, 1950, pp. 6, 5 cents.

Black rot, caused by *Endoconidiophora fimbriata*, attacks all varieties and results in heavy losses, particularly during shipment or storage, in all parts of the U.S.A. It could be eliminated if the preventive and control measures described here, and relating to the growing crop, the harvested crop and storage house sanitation, were properly applied.

646. KAWARADA, M., MATSUBARA, S., AND SAKURAI, S.  
**On the electric heating storage of sweet potatoes with reference to the control of black rot. [Japanese.]**  
*J. hort. Ass. Japan*, 1948, **17**: 69-72, illus.

This is an account of a mechanism devised for storing sweet potatoes under controlled temperature and humidity conditions, with particular reference to the prevention of the spread of black rot [*Ceratostomella fimbriata*].

647. DEONIER, M. T., AND OTHERS.  
**Cooperative studies of the delayed harvesting of sweetpotatoes.**  
*Circ. U.S. Dep. Agric.* **841**, 1950, pp. 22, bibl. 8.

The conventional storage of sweet potatoes to be used



for manufacturing purposes is not economical. At trials carried out in Mississippi and Louisiana for 3 years and in Texas for 2 years the yields of sound roots showed only slight decreases with delays of harvest up to 5-6 weeks after the first killing frosts. Delays of 8-9 weeks, however, resulted in serious decreases in yields. The maximum content of starch was obtained at or before the first frost. Cut vines or earthing up afforded no protection in the field. There were only small reductions in starch content in freshly harvested roots stored in unheated sheds for 1 week. Shed storage of the sweet potato variety Triumph for as long as 2 months was practicable only with roots harvested not later than 2 weeks after the first frost, except perhaps in mild weather with storage temperatures above 50° F. The edible quality of Porto Rico roots was impaired by low temperatures both in the field and in storage; the table-type sweet potatoes should be shed-stored only in an emergency.

648. COOLEY, J. S., AND SMART, H. F.  
**Spoilage of sweet potatoes stored at 50°, 55°, and 60° F.**

Abstr. in *Phytopathology*, 1950, 40: 869-70.  
 More spoilage occurred in all varieties tested when stored at 50° than at 55° or 60°, which possibly indicates that 50° is a "chilling" temperature for sweet potatoes.

#### Tomatoes and related plants.

(See also 26, 42, 60, 73, 81, 83, 86, 88, 219, 301, 337, 357, 402, 405, 406, 485, 539, 543, 599, 687e, q, v, 688a, b, e, h, p, q, 754, 773, 775, 904, 992, 1214, 1221, 1222, 1231, 1232, 1237.)

649. ISHIGURO, K.  
**Varietal differences in wilt disease resistance of eggplant and tomato on successively cropped lands.** [Japanese.]  
*J. hort. Ass. Japan*, 1949, 18: 189-97, bibl. 9.

Eggplant and tomato were grown, for a series of years (eggplant 11-22, tomato 4-12) in the same places in order to obtain varieties resistant to the fusarium wilt disease. The plants, grown without added fertilizers, showed different degrees of susceptibility to the disease. Excessive moisture as well as excessive drought gave a high susceptibility. Observations in areas with different meteorological conditions indicated the possibility of raising many varieties resistant to wilt disease.

650. SMITH, P. G.  
**Inheritance of brown and green mature fruit color in peppers.**  
*J. Hered.*, 1950, 41: 138-40, bibl. 7.

The brown colour of ripe pepper fruit, *Capsicum annuum*, is a result of the combination of the normal red pigments and undecomposed chlorophyll [see *H.A.*, 18: 2836, where *C. frutescens* was used]. Crossing the brown fruited form with a yellow fruited variety, resulted in an  $F_1$  that was red and an  $F_2$  that segregated 9 red:3 brown:3 yellow:1 green. The last fruit represents a ripe fruit colour new for this species. [From author's summary.]—University of California, Davis.

651. VENKATARATNAM, L., AND SATYANARAYAN-MURTHY, K.

**Some reactions induced by 2,3,5-tri-iodobenzoic acid on chillies, *Capsicum annuum* L.**  
*Curr. Sci.*, 1950, 19: 253-4, bibl. 8, illus.

Young chilli seedlings sprayed with 2,3,5-tri-iodobenzoic acid at 25, 50 and 100 p.p.m. showed temporary leaf distortion, growth inhibition of the apical meristem, and stimulated but distorted growth of axillary buds. Similar responses occurred in tomatoes, but with mangoes no reaction was noticed even with 100 p.p.m. In no case were any florigenic properties exhibited.

652. IBRAGIMOV, G. R.  
**A new disease of pepper and its control.** [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 8, p. 26.

The symptoms of this disease caused by *Colletotrichum multisetorum*, which attacks peppers [*Capsicum*] on the shores of the Black Sea, are described. Control measures include crop rotation, seed treatment with hot water at 50° C. for 15-20 min., or with dry heat at 55° C. for 30 min.; and 2 sprays of 1% bordeaux mixture, one before flowering, the other 15-20 days after.

653. MCKEEN, C. D.  
**Soft rot in peppers and its transmission by the corn borer.**  
*Plant Dis. Rept.*, 1950, 34: 179-80, bibl. 1, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric. Canada* 1026.

In observations recorded, within 5 days soft rot (*Erwinia carotovora*) developed around 85% of the entrances made by the larvae of the corn borer. It is apparent that disease prevention can only be obtained by controlling the corn borer.

654. MINISTRY OF AGRICULTURE, LONDON.  
**Tomatoes.\***  
*Bull. Minist. Agric. Lond.* 77, 3rd ed., 1950, pp. 56, bibl. 18, illus., 2s. 6d.

In this new edition the material has been rearranged to considerable advantage, and the findings of the John Innes Horticultural Institution on the value of soil blocks for plant raising, factors affecting the production of rogue plants, and varieties of dwarf and bush tomatoes for outdoor culture have been incorporated to bring the bulletin up to date. There are several excellent new plates showing various types of glass-house used for tomato production, methods of propagation, and steps in the preparation of the crop for market.

655. MINISTRY OF AGRICULTURE, LONDON.  
**Outdoor tomatoes.**  
*Adv. Leaflet. N.A.A.S. Lond.* 360, 1950, pp. 5.  
 Contains notes on varieties, plant raising, cultural practices, grading and packing, and pests and diseases.

656. MACGILLIVRAY, J. H., MICHELbacher, A. E., AND SCOTT, C. E.  
**Tomato production in California.**  
*Circ. Calif. agric. Ext. Serv.* 167, 1950, pp. 60, illus.

\* For abstract of the 2nd edition, see *H.A.*, 18: 2704.

About 85% of California tomatoes are used for canning, amounting to approximately 1,000,000 tons, grown on 115,000 acres. The economic aspects of the industry, temperature requirements, cropping systems, fertilizers, varieties, and production costs are discussed. The various methods used to start the crop are: direct field seeding with or without protection, thin seeding in cold frames followed by field planting, and seeding in hotbeds followed by transplanting first to cold frames and then to the field. A detailed description is given of these practices and of irrigation, staking and pruning, and harvesting and handling. There is a section on the identification of pests and diseases and their control. The circular is well illustrated throughout.

657. MOORE, C. A.

**Green wrap tomato production and marketing practices in the Monticello Ridge area of Drew County, Arkansas.**

*Bull. Ark. agric. Exp. Stat.* **492**, 1950, pp. 20, illus.

The results are presented of a survey made in 1947 to investigate the relationship of tomato production to the total farm production of the area, and to determine the materials, labour, power and practices used, and the costs of production and marketing.

658. BREŽNEV, D. D.

**Intravarietal crossing in tomatoes.** [Russian.] *Agrobiologija* (Agrobiology), 1949, No. 6, pp. 57-63.

Tomato plants from seeds derived from intravarietal crossing were more vigorous, fruited earlier, had larger fruit and 7-70% larger crops, stood dry conditions better and were less subject to diseases, than plants from seeds of free self-pollination.

659. TILKIN, N.

**Étude des rendements d'une collection de variétés de tomate. (Yields of a series of tomato varieties.)** [Flemish, German and English summaries  $\frac{1}{3}$  p. each.] *Bull. Inst. agron. Gembloux*, 1950, **18**: 164-79.

A series of tomato varieties, 122 in 1947, 110 in 1948 and 46 in 1949, were grown in the open at the State Research Station for Fruit and Vegetable Improvement, Gembloux, with a view to determining variations in yield in relation to weather conditions. All plants were stopped at 2 trusses. It is concluded that, under Belgian conditions, only varieties with an average yield of 2 kg. per plant in a favourable year are suitable for outdoor culture. The way in which weather conditions affect earliness as well as total yield is discussed.

660. TURBIN, N. V., AND KOZLOV, V. E.

**The chromoscopic observation of sections of seeds of parental and hybrid forms of tomatoes.** [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1948, **63**: 197-9, bibl. 2, illus. [received 1950].

By special staining and the use of ultraviolet rays (wave-length 436 m $\mu$ ), sections were photographed of tomato seeds obtained from two parental varieties, Sparks ♀ and Affiasetta ♂, and a hybrid derived from crossing them. The photographs showed that the reaction of the embryos of the hybrid's seeds to the treatment was similar to that of the parent ♀ Sparks.

It had previously been shown that the hybrid had other dominant characters of the ♀ parent, e.g. the divided form of the leaves.

661. DICKEY, R. S., AND ARK, P. A.

**Studies on penetration of mercury into tomato seeds.**

*Abstr. in Phytopathology*, 1950, **40**: 965.

Seeds treated with HgCl<sub>2</sub> 1:1,000, 1:2,000, and Ceresan 1:1,250 (10 min.) and washed with 0.1 N H<sub>2</sub>SO<sub>4</sub> (30 min.) gave 100% germination when grown in the greenhouse.

662. HEMPHILL, D. D., AND MURNEEK, A. E.

**Light and tomato yields.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 346-50, bibl. 1, being *Contr. J. Ser., Dep. Hort., Mo. agric. Exp. Stat.* **1181**.

In three greenhouse experiments with Master Marglobe tomatoes, yields increased in all cases as the amount of sunlight available between first blossoming and the end of harvest increased. Spraying the flower clusters with p-chlorophenoxyacetic acid at 10 p.m. also increased yields, especially in the winter, as a result of improved efficiency of light utilization. In field-grown tomatoes a similar close correlation was established between yields and total solar radiation.

663. SILBERSCHMIDT, K., AND ANDRADE, A. C.

**Anomalias no desenvolvimento e na produção de tomateiros causadas por nutrição inadequada. (Anomalies in the development and production of tomato plants caused by unsuitable nutrition.)** [English summary 3 $\frac{1}{2}$  pp.]

*Arg. Inst. biol. S. Paulo*, 1949-50, **19**: 117-48, bibl. 9, illus.

A marked inhibition of blossom opening, a failure of the lower trusses to set fruit, and leaf distortion were noticed in many commercial tomato plantings in the State of São Paulo, Brazil, in 1947. An investigation into the cause of the trouble revealed that the symptoms were due to the use of a commercial fertilizer containing Chilean sodium nitrate with a high percentage of sodium perchlorate.

664. EMMERT, E. M., AND KLINKER, J. E.

**Spraying tomato foliage with sucrose to increase carbohydrates and protect against injury by urea sprays.**

*Bull. Ky agric. Exp. Stat.* **550**, 1950, pp. 6, bibl. 2.

Equal molar solutions of sucrose mixed with urea solutions stopped urea burning in all cases and enabled ten times as much urea to be used on tomatoes without burning as when no sucrose was used; namely, 50 lb. instead of 5 lb. to 100 gallons. Sucrose spraying increased the sucrose in the extracts of both leaves and fruits. Quality and taste of the fruits on the sucrose-sprayed plants were much better. The effect of sucrose spraying on yields is yet to be determined. [Authors' summary.]—University of Kentucky.

665. LARSON, R. E., POLLACK, B. L., AND FLEMING, H. K.

**Response of field grown tomatoes to radioactive materials.**

*Progr. Rep. Pa agric. Exp. Stat.* **27**, 1950, pp. 3, bibl. 2.



Trials were made at the Erie County Field Research Laboratory, Pennsylvania, to determine the effect of Alphonon (radioactive materials in dolomitic limestone) and Alphonol (radioactive materials used as a starter solution) on the growth of tomato plants variety Rutgers. No stimulation of growth or increase, in yield was obtained.

666. ODLAND, M. L., AND CHAN, N. S.

The effect of hormones on fruit set of tomatoes grown at relatively low temperatures.

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 328-34, bibl. 6, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1544.

Inflorescences of Pennheart tomato plants coming into flower in a greenhouse were sprayed with 50 p.p.m.  $\beta$ -naphthoxyacetic acid and subjected to different periods of low night temperature (40° F.). The data showed that the hormone treatment applied in the late bud or flower stage practically overcame the adverse effects on fruiting of low light intensity, short day length and low night temperature. Material increases in early yields were also obtained using the same hormone at 30 p.p.m. in tomatoes planted out in the field in May, which were subjected to low night temperatures both before and after planting. Responses were much more marked when individual flower clusters were treated than when whole plants were sprayed.

667. WITTWER, S. H., AND SCHMIDT, W. A.  
Further investigations of the effects of "hormone" sprays on the fruiting response of outdoor tomatoes.

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 335-42, bibl. 8, being *J. Art. Mich. agric. Exp. Stat.* 1136 (n.s.).

The results of experiments in Michigan with several tomato varieties in 1948 and 1949 lend support to the concept, previously outlined [see *H.A.*, 19: 407], that growth substances result in significant increases in early fruit production of outdoor tomatoes if they are applied to the flower clusters during periods in the early growing season when night temperatures are below 59° F. The magnitude of the response depends on the duration of time after flowering begins when night temperatures remain too cool for optimum fruit set. These conclusions are based mainly on the use of 30 p.p.m. para-chlorophenoxyacetic acid (CIPA), applied to the flower clusters only. Slight but insignificant responses were obtained with whole plant applications of  $\beta$ -naphthoxyacetic acid at 50 p.p.m. and alpha-ortho-chlorophenoxy-propionic acid at 20 and 40 p.p.m. A possible explanation of the failure of whole plant treatment is discussed in the light of these and other results. [See also abstract 666 above.]

668. WURLER, W., AND MOTTIER, P.

Fructification des tomates et substances de croissance. (Fruit development in tomatoes and growth substances.)

*Rev. hort. suisse*, 1950, **23**: 339-45, bibl. 8.

Fresh experiments confirmed the results of the previous year [see *H.A.*, 19: 1288], viz. that the application of growth substances to glasshouse tomatoes advanced the date of maturity, the substances used being the sodium salts of 4-chlorophenoxyacetic acid at 50

p.p.m. and of  $\beta$ -naphthoxyacetic acid at 100 p.p.m. The figures presented show that the treatment is profitable in southern Switzerland if applied to glasshouse tomatoes, while it does not pay to spray outdoor crops. Flower buds treated during the completely closed stage were often found to develop into hollow fruits.

669. JAKUŠKINA, N. I.

Physiological and biochemical changes in plants resulting from applying growth substances. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, **61**: 939-42, bibl. 12 [received 1950].

In experiments with tomatoes it was found that spraying with 2,4-D (10 p.p.m.) increased the size of the fruit and significantly decreased growth of leaves, stems and side shoots.

670. IVANOVSKAJA, T. L.

The effect of 2,4-dichlorophenoxyacetic acid on tomato plants. [Russian.]

*Agrobiologija* (Agrobiology), 1949, No. 5, pp. 113-26, illus.

In treating plants with 2,4-D an increase in concentration causes a corresponding increase in the distortion of the leaves. In tomato its effect depends on the age of the plants. Before flower-bud formation the plants recover more quickly from treatment than they do if it is applied during bud formation. The effect depends on the environment. Plants growing under unfavourable conditions react more strongly than those under conditions favourable for growth. The symptoms of 2,4-D poisoning can be transmitted to healthy plants by introducing sap from, and by grafting with, treated plants.

671. NETTLES, V. F.

The relationship of specific gravity of tomato fruits to their stage of maturity.

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 343-5, bibl. 2.

From the data obtained in these tests it appears that the use of specific gravity as a means of establishing the stage of maturity of tomato fruits is of little practical value due to wide variation in individual fruits. The relationship of soluble solids, expressed as percentage of sucrose, to the specific gravity of mature-green and storage-ripened fruits was of mathematical but not of practical significance. [Author's summary.]

672. COX, C. E., AND WEAVER, L. O.

Internal browning of tomatoes in Maryland. Abstr. in *Phytopathology*, 1950, **40**: 870.

Juice from infected tomato plants applied with carborundum resulted in mild mottling of tomato foliage, mosaic and stunting of tobacco, necrotic spotting of *Nicotiana glutinosa*, flecking of primary leaves of cucumber, and bleaching of leaf bases accompanied by severe stunting and defoliation of pepper.

673. BEACH, W. S.

Tomato spraying in Pennsylvania.

*Bull. Pa agric. Exp. Stat.* 531, 1950, pp. 32, bibl. 35, illus., and *Bull.* 531P, pp. 6.

The first of these, a "technical" bulletin, gives an account of the principal tomato diseases, fungicides, spray schedules and experimental results. The second

is a discussion and summary of the material contained in the first. Different fungicides were tested over 6 years for the control of late blight (*Phytophthora infestans*), early blight (*Alternaria solani*), anthracnose (*Colletotrichum phomoides*) and leaf-spot (*Septoria lycopersici*) which are briefly described. Bordeaux and tribasic copper sulphate were the most effective in control of late blight. Ziram applied separately gave the best and most consistent control of anthracnose. Zineb was especially effective against early blight and about 10% less effective than ziram against anthracnose. As a rule, spray treatments which included ziram and tribasic copper sulphate were superior to a single fungicide when control of disease, yield, rate of production and the proportion of mature healthy fruit are considered.

674. BAILEY, D. L.  
Studies in racial trends and constancy in *Cladosporium fulvum* Cooke.  
*Canad. J. Res., Sect. C*, 1950, **28**: 535-65, bibl. 12.

Intensive surveys of the physiological races of *Cladosporium fulvum* Cke have been carried out during the past decade in south-western Ontario, as a result of which seven such races have been identified. These are separated by differential reactions of the following hosts: *Lycopersicon esculentum* Mill. varieties Potentate, Stirling Castle, Vetomold, V-121, and V-473; *L. pimpinellifolium* (Jusl.) Mill., Vineland, No. 160 and No. 11-22-15 strains; *L. hirsutum* Humb. and Bonpl. and *L. hirsutum* var. *glabratum* Muller. Evidence is presented that only two of these races existed when the surveys began and that the other five have arisen, probably through mutation, during the period under study. There is further a strong suggestion that the stimulus responsible for these mutations is somehow related to the colonization of an incompatible host by a race which remains stable pathogenically while in association with a susceptible host. [From author's abstract.]—Toronto Univ.

675. CONOVER, R. A., WALTER, J. M., AND STODDARD, D. L.  
Control of late blight of tomatoes in Florida.  
*Press Bull. Fla agric. Exp. Stat.* **652**, 1948, pp. 4 [received 1950].

Spraying with dithane D-14 is recommended, in seedbeds applied once a week, in the field at 5- to 7-day intervals.

676. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.

**Foot rot and similar diseases of tomato and other plants.**

*Adv. Leaf. Dep. Agric. Scotland* **16** (n.s.), 1950, pp. 8, illus., H.M. Stationery Office, Edinburgh, 6d.

Damping-off and root and foot rots are described; they are caused chiefly by *Phytophthora cryptogea* and *P. parasitica*, but other fungi are also associated with these diseases. Preventive and control measures, including the use of Cheshunt compound, are outlined.

677. CONOVER, R. A.  
Data on the control of gray leaf spot of tomato.  
*Plant Dis. Reprtr*, 1950, **34**: 182.

All fungicides providing zinc ethylene bisdithiocarbamate, except Parzate, were outstanding in Florida in gray leaf spot (*Stemphylium solani*) control.

678. WILHELM, S.  
The inoculum potential of *Verticillium albo-atrum* as affected by soil amendments.  
Abstr. in *Phytopathology*, 1950, **40**: 970.

In tests with tomato plants grown in field-infected soil in pots, it was found that blood meal, fish meal, ammonium sulphate, chopped alfalfa hay, barley straw, and cottonseed meal (listed in order of decreasing effectiveness) reduced the inoculum potential of *Verticillium albo-atrum*.

679. WHITE, W. H., AND OTHERS.  
Control of the tomato pinworm.  
*Res. Achiev. Sht U.S. Dep. Agric. R.A.S.* **130(E)**, 1950, pp. 2.

Small "pinholes" are made in tomato fruits when the larvae of the pinworm enter. The pest is controlled with cryolite.

*Other crops.*

680. WATANABE, T.  
On the influence of the hydrogen ion concentration on the development of the atrophic fire-blight disease of the udo salad plant.  
[Japanese, English summary.]  
*Ann. phytopath. Soc. Japan*, 1940, **10**: 186-91, from abstr. in *Jap. J. Bot.*, 1941, **11**: (125) [received 1950].

No relationship was observed between the pH of the juice of leaves and stems of *Aralia cordata* and the severity of attack by the fungus *Phoma araliae* var. *microspora*.

681. ANON.  
El apio. (*Arracacia xanthorrhiza*).  
*Agric. venezol.*, 1950, **14**: 141: 2, illus.

A brief note on the chemical composition, cultivation and uses of this South American root vegetable.

682. LEACH, L. D., AND OSWALD, J. W.  
Curly dwarf, a virus disease of globe artichoke.  
Abstr. in *Phytopathology*, 1950, **40**: 967-8.

This disease of globe artichokes (*Cynara scolymus*) is characterized by curling and dwarfing. Affected plants at first produce abnormal buds, then become unproductive, decline in vigour, and often die. Thus far only artichoke, cardoon, zinnia, and milk thistle (*Silybum marianum*) have been found to be hosts.

683. NORO, K.  
On "Kikuimo-magai", *Helianthus macrophyllus* var. *sativus*. [Japanese, English summary  $\frac{1}{2}$  p.]  
*J. hort. Ass. Japan*, 1949, **18**: 237-40, bibl. 7, illus.

This plant, which closely resembles the Jerusalem artichoke, blossoms at the beginning of August while the Jerusalem artichoke flowers at the beginning of September. It has small, finger-shaped, pale yellow tubers. There is less laevulose in the tubers than in the Jerusalem artichoke, but as there are larger amounts of albuminous substances it is more useful as a vegetable.



684. REYNARD, G. B., AND PORTER, D. R.

**Emerald okra.**

*Seed World*, 1950, 67: 6: 38, 47, illus.

An account of the development of the new round-podded okra variety, Emerald, bred by a commercial firm at Camden, N.J., and a description of the variety. Emerald is a semi-dwarf plant with dark green, round, smooth pods; it has yielded well in tests in New Jersey, California and Georgia.

685. LAKSHMIKANTA, S. R., AND GOVINDARAJAN, S. V.

**Sensitivity of patchouli to manganese deficiency in soils.**

*Curr. Sci.*, 1950, 19: 280-1, bibl. 2.

Patchouli, *Pogastemon patchouli*, like spinach, is sensitive to Mn deficiency and develops characteristic symptoms which are described here. Tabulated analyses of both healthy and chlorotic leaves of both plants show much reduced Mn and also reduced Fe contents in the latter. Manganese sulphate sprayed at 5-10 lb. per acre effects a cure in young leaves.

686. ANON.

**Downy mildew of rhubarb.**

*Agric. Gaz. N.S.W.*, 1950, 61: 293-4, illus.

The downy mildew of rhubarb (*Peronospora jaipiana*) may cause severe damage in wet seasons, when the plants should be sprayed with bordeaux mixture 1-1-10.

**Noted.**

- 687.

- a ANON.

**Fall armyworm (*Laphygma frugiperda* (A. and S.)).**

*Pict. Sheet U.S. Dep. Agric.* 12, revised 1950, pp. 2, illus.

- b BEDFORD, C. L., AND HARD, M. M.

**The effect of cooling method on the ascorbic acid and carotene content of spinach, peas, and snap beans preserved by freezing.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 403-9, bibl. 12, being *Sci. Pap. Wash. St. agric. Exp. Stats* 871.

- c BEHR, L.

Histologische Untersuchungen an krätze-kranken Gurken (*Cucumis sativus* L.) unter besonderer Berücksichtigung des Krankheitsverlaufes der Krätze (*Cladosporium cucumerinum* Ell. et Arth.) an Früchten. (A histological investigation of cucumber gummosis with reference to the course of the disease (*Cladosporium cucumerinum*) on the fruit.)

*Phytopath. Z.*, 1949, 15: 92-123, bibl. 31, illus.

- d BLANCHARD, R. A., AND OTHERS.

**DDT sprays for control of the corn earworm and the budworm in sweet corn.**

[Mimeo. Publ.] *U.S. Dep. Agric.* E-780, 1950, pp. 8, illus.

- e BREŽNEV, D. D.

The influence of growing conditions on the characteristics of tomatoes. [Russian.] *Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 49-55, bibl. 1, illus.

- f BRIMHALL, B., AND HABER, E. S.

**Relation between date of harvesting, moisture content and dry weight of kernels of sweet corn harvested for seed.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 413-15, bibl. 3, being *J. Pap. Ia agric. Exp. Stat.* J1703.

- g BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.

**Striped cucumber beetle [*Acalymma vittata* (F.)].**

*Pict. Sheet U.S. Dep. Agric.* 7, revised 1950, pp. 2, illus.

- h CARIBBEAN COMMISSION.

**The vegetables trade of the Caribbean.**

*External Trade Bull. Caribbean Comm.* 7, 1950, pp. 221.

Detailed tabulated information on both imports and exports.

- i COCHRAN, F. D.

**A study of the species hybrid, *Allium ascalonicum* × *Allium fistulosum* and its back-crossed progenies.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 293-6, bibl. 7, illus., being *Pap. J. Ser. N.C. agric. Exp. Stat.* 328.

- j COCHRAN, F. D., AND OTHERS.

**Grow quality sweet potatoes.**

*Ext. Circ. N.C. agric. Ext. Serv.* 353, 1950, pp. 16, illus.

- k COX, J. A., AND OTHERS.

**Growing cabbage in Louisiana.**

*Agric. Ext. Publ. La Div. agric. Ext.* 1043, 1950, pp. 15, illus.

- l DOVASTON, H. F.

**Recent glasshouse research in the south of England.**

*Gr. Digest*, 1949, 1: 3: 11-14.

- m DUKA, V. I.

**A scientific fertilizing system in vegetable-grassland rotations. [Russian.]**

*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 45-9.

- n DE FLUITER, H. J.

De invloed van daglengte en temperatuur op het optreden van de geslachtsdieren bij *Aphis fabae* Scop., de zwarte bonenluis. (The effect of length of day and temperature upon the occurrence of the sexual forms in *Aphis fabae* Scop., the black bean aphid.) [English summary 2 pp.]

*Tijdschr. PZiekt.*, 1950, 56: 265-85, bibl. 42.

- o FRY, P. R.

**Lettuce mosaic.**

*N.Z. J. Agric.*, 1950, 80: 159.

- p HABER, E. S.  
Longevity of the seed of sweet corn inbreds and hybrids.  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 410-12, bibl. 1, being *J. Pap. la agric. Exp. Stat.* J1660.
- q HESTER, J. B.  
Fundamental studies on some tomato producing soils.  
*Res. Monogr. Dep. agric. Res. Campbell Soup Co.* **1**, 1945, pp. 46, bibl. 18, illus. [received 1950].
- r HOPP, R.  
Vegetable varieties for Vermont.  
*Pamph. Vt agric. Exp. Stat.* **21**, 1950, pp. 12.
- s HUDON, M., Jr.  
La mouche de l'oignon, *Hylemyia antiqua* Meigen. (The onion fly.)  
*Rev. d'Oka*, 1950, **24**: 35-50, bibl. 68.  
A review of our present state of knowledge on its biology and control.
- t JOSLYN, M. A.  
Report on peroxidase in frozen vegetables.  
*J. Ass. off. agric. Chem. Wash.*, 1950, **33**: 504-17.
- u LEA, A. O., AND NISWANDER, R. E.  
*Oncopeltus fasciatus* reared for laboratory testing on watermelon seeds.  
*J. econ. Ent.*, 1950, **43**: 386.
- v LEYENDECKER, P. J., Jr.  
Blossom-end rot of pepper (*Capsicum annum* L.) in New Mexico.  
*Phytopathology*, 1950, **40**: 746-8, bibl. 9, illus.
- w LINDEBERG, G.  
Phenol oxidases of the cultivated mushroom *Psalliota bispora* f. *albida*.  
*Nature*, 1950, **166**: 739, bibl. 4.
- x MCCUBBIN, E. N., EDDINS, A. H., AND KELSHEIMER, E. G.  
Growing cabbage plants in seedbeds.  
*Press Bull. Fla agric. Exp. Stats* **656**, 1948, pp. 4 [received 1950].
- y MAKHDUM, N. A., AND RIAZ-UR-RAHMAN.  
Canning of green peas—best selection.  
*Punjab Fruit J.*, 1950, **14**: 4-6.
- z MICHELbacher, A. E., AND ESSIG, E. O.  
Ridding the garden of common pests.  
*Circ. Calif. agric. Ext. Serv.* **146**, 1950, pp. 40, illus.
- 688.
- a NAKATA, K., AND TAKIMOTO, S.  
Studies on the "yellow tobacco mosaic" or "aucuba mosaic" of tomato. [Japanese, English summary.]  
*Bul. Sci. Fak. Terkult. Kyūsyū imp. Univ.*, 1940, **9**: 167-78, illus., from abstr. in *Jap. J. Bot.*, 1941, **11**: (107) [received 1950].
- b NAKATA, K., AND TAKIMOTO, S.  
A ring strain of common mosaic found on pepper. - [Japanese, English summary.]  
*Bul. Sci. Fak. Terkult. Kyūsyū imp. Univ.*, 1940, **9**: 179-89, illus., from abstr. in *Jap. J. Bot.*, 1941, **11**: (106) [received 1950].
- c NUGENT, T. J.  
The relative importance of the various control measures for sweet potato scurf.  
Abstr. in *Phytopathology*, 1950, **40**: 873.
- d ODLAND, M. L., AND NOLL, C. J.  
The utilization of cross-compatibility and self-incompatibility in the production of F<sub>1</sub> hybrid cabbage.  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 391-402, bibl. 21, illus., being *Pap. J. Ser. Pa agric. Exp. Stat.* **1071**.
- e OWEN, O.  
Nutrition of the tomato.  
*Gr. Digest*, 1950, **2**: 1: 27-36.
- f PLINKA, A. D.  
Onion growing in one year by autumn sowing. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 49-50, illus.
- g POLEŠČUK, P. M.  
Garlics of the Don basin. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 61-4, illus.
- h PURDUE, C. E.  
Trellising of tomatoes: methods and costs determined by experiment.  
*Agric. Gaz. N.S.W.*, 1950, **61**: 188, illus.
- i RUSANOVA, A. P.  
Summer planting of cabbages as a way of avoiding deformation of the flowers of plants for seed. [Russian.]  
*Agrobiologija* (Agrobiology), 1949, No. 6, pp. 51-6.
- j SHIFFRIS, O.  
Spontaneous mutations in the American varieties of *Cucumis sativus* L.  
*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 351-7, bibl. 11, illus.
- k SPEYER, W.  
Tierische Schädlinge der Kohlpflanzen. (Cabbage pests.)  
*Flugbl. biol. Zentralanst. Braunschweig*, **H3**, 1950, pp. 12, illus.
- l SYLVESTER, E. S.  
Transmission of *Brassica nigra* virus by the green peach aphid [*Myzus persicae*].  
*Phytopathology*, 1950, **40**: 743-5, bibl. 7.
- m SYLVESTER, E. S.  
Effect of starving infective aphids on the transmission of the beet yellow-net virus.  
*Phytopathology*, 1950, **40**: 782, bibl. 2.



- n TEŠIČ, Ž.  
A rare variety of *Bacterium* recorded for Yugoslavia [on haricot beans]. [Jugoslavian, Russian and French summaries 1 p. each.] *Yearb. Fac. Agric. Belgrade*, 1949, 2: 103-15, bibl. 12.
- o THAURY, J.  
Les légumineuses cultivées pour l'alimentation de l'homme et des animaux. Les ennemis des cultures de légumineuses. (Leguminous plants cultivated as food or fodder: their parasites and pests.) *Thèse Fac. Pharm. Univ. Strasbourg* 406, 1946, pp. 118, bibl. 30, illus. [received 1950].
- p U.S. DEPARTMENT OF AGRICULTURE. —  
Control of pepper weevils.  
*Res. Achiev. Sht U.S. Dep. Agric. R.A.S.* 132E, 1950, pp. 2.  
DDT dust (10%) is more effective than cryolite.
- q WALTER, J. M.  
The influence of mosaic on yield of staked tomatoes.  
Abstr. in *Phytopathology*, 1950, 40: 791.  
A factorial split-plot field study.
- r WESTER, R. E., AND JORGENSEN, H.  
Emasculation unnecessary in hybridizing lima beans.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 384-90, bibl. 5, illus.
- s WINTER, G.  
Viruskrankheiten an Kohlgewächsen. (Virus diseases of brassicas.)  
*Flugbl. biol. Zentralanst. Braunschweig*, H12, 1950, pp. 6, illus.
- t WORK, P., AND ELLE, G. O.  
Newer varieties of vegetables for 1950.  
*Ext. Bull. Cornell agric. Exp. Stat.* 782, 1950, pp. 15, illus.

## POTATOES.

### General.

(See also 768e, r, 1237.)

689. McDERMOTT, N.  
Progress in potato growing.  
*Agriculture, Lond.*, 1949, 56: 378-85.  
A brief review of the progress made by breeding and trial, with notes on varieties and the relations existing between growers and merchants.

690. YEPES, E., AND MOLINA B., L.  
El cultivo de la papa en Antioquia. (The culture of potatoes in Antioquia [Colombia].)  
*Agric. trop. Bogota*, 1949, 5: 6: 9-14.

Some statistical data on potato production in the department of Antioquia are followed by a report of 2 fertilizer experiments in the districts of La Ceja and San Pedro, the results of which are of local interest.

691. NAVARRO, G.  
Observaciones sobre la producción de papas en el Uruguay. ([Seed] potato production in Uruguay.)  
*Rev. Asoc. Ingen. agron. Montevideo*, 1949, 21: 86/87: 37-79, bibl. 89.

The literature on the problems of seed potato production in Uruguay and on methods of overcoming them is reviewed. Virus "degeneration", the prevalence of *Phytophthora infestans* and *Epicaula adspersa*, unsuitable climatic conditions for storage, and the long dormancy period of the tubers are the main problems. The most promising long-term solution lies in the breeding of resistant varieties, well adapted to local conditions, and suitable methods of breeding and selection are discussed. In variety trials with varieties introduced from Sweden, Katahdin and Pontiac gave the best results in respect of yield, quality and disease resistance.

### Breeding and varieties.

(See also 301, 540, 729, 768b, c, f, g, h, o, 1213, 1222, 1227, 1239.)

692. ARHANGELSKII, S. A.  
Breeding hybrid forms of South American potatoes. [Russian.]  
*Agrobiologija* (Agrobiology), 1950, No. 1, pp. 141-6.

South and Central American species of potato do not produce tubers under the long-day conditions of the south-eastern U.S.S.R., and the hybrids between these species and cultivated varieties tend to retain this disadvantage. Further hybridization trials have been carried out with the object of raising new varieties, and subjecting them to special illumination to induce them to produce tubers. Data are presented of tests with seedlings of the cross *Epicure* × *Solanum demissum*, subjected to short-day treatment. This induced tuber formation, which also occurred in the subsequent generation when illuminated by the ordinary daylight of southern Russia.

693. RATERA, E. L.  
Observaciones sobre la floración de variedades cultivadas de papas (*Solanum tuberosum* L.) y de especies silvestres argentinas. (Observations on the flowering of cultivated varieties of potato (*Solanum tuberosum*) and of wild Argentinian species.) [English summary 9 lines.]  
*Rev. Agron. B. Aires*, 1949, 12: 253-8, bibl. 12.

The flowering of 10 varieties of *Solanum tuberosum* and 12 wild Argentinian species of *Solanum* was studied over a minimum period of 4 years at the Institute of Genetics, Buenos Aires. The varieties Alma, Katahdin, Konsuragis and Majestic flowered and fruited well. All the wild species flowered abundantly, but only the following set fruit: *S. chacoense* Bit., *S. garciae* Juz. and Buk., *S. gibberulosum* Juz. and Buk.,

*S. horovitzii* Buk., *S. henryi* Buk. and Lechn., *S. parodii* Juz. and Buk., and *S. subtilius* Bit.

694. DE CORTAZAR, C. S.

Observación de la esterilidad en algunas papas. (Sterility in some potato varieties.) [English summary  $\frac{1}{2}$  p.]

*Agric. téc. Chile*, 1949, 9: 99-114, bibl. 12.

The causes of sterility in 262 varieties of potato were studied at the Centinela Experiment Station, Puerto Octay, in 1947 and 1948. Data are tabulated on the production of flowers and fruit, the tendency to premature flower and fruit fall, the quantity and quality of pollen and the results of hand pollinations.

695. BOOCK, O. J.

Variedades de batatinhas (*Solanum tuberosum* L.) procedentes da Holanda. Partes 1 en 2. ([Trials in Brazil with] Dutch potato varieties. Parts 1 and 2.) [English summaries  $\frac{1}{2}$  p. each.]

*Bragantia*, 1948, 8: 25-52, bibl. 2, illus., and 53-73, bibl. 2, illus. [received 1950].

In the first trial, 8 potato varieties imported from Holland were planted in various parts of the state of São Paulo in February, 1947. Voran and Alpha proved most resistant to *Phytophthora*, while Eersterling and Saskia were the most susceptible. Doré, Eersterling, Saskia and Geelblon matured early; Alpha, Voran and Libertas were late. Yields were low, Eigenheimer and Bintje yielding the best. In the second trial, seed selected from the crop produced in the first trial was planted in September of the same year. The results confirmed those of the first trial, but the yields were much higher owing to the better distribution of rainfall.

696. KASPAROVA, S. A., AND VARTAPETJAN, S. M.

The depressing effect of the geographical factor on potatoes. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1577-80, bibl. 19 [received 1950].

Potato varieties grown in the polar regions become less productive when transferred to more southern regions. This is attributed to a lack of adaption of the enzymic processes to the new conditions shown by such plants which have low temperature coefficients.

697. LARSON, R. H., AND ALBERT, A. R.

Relation of potato varieties to incidence of physiological internal tuber necrosis.

*Amer. Potato J.*, 1949, 26: 427-31, bibl. 8.

Over a period of years varieties have been found to differ considerably in susceptibility to internal necrosis. A comparative index (6-year average) for American and British varieties under trial, and a tentative classification of these varieties, are given.—University of Wisconsin.

698. RUDORF, W., AND OTHERS.

Breeding of resistant varieties of potatoes.

I. The basis for the breeding of potatoes resistant to late blight (*Phytophthora infestans*, de Bary).

*Amer. Potato J.*, 1950, 27: 222-35, bibl. 43, illus.

1. An introductory historical survey of the breeding for

late blight (*Phytophthora infestans*) resistance is given. 2. The results of the investigation on specialization problems and on methods of selection for resistance for the interval of 1936-1945 (Müncheberg/Mark) and 1947-1948 (Voldagsen/Han.) are discussed. 3. The assortment of commercial varieties must be divided into two groups: (i) Pure *tuberosum* varieties, which are highly susceptible with the exception of very few varieties with some degree of resistance. (ii) "Hybrid varieties" with different degrees of resistance, which may be used as differential varieties in specialization researches. 4. Some more wild species could be classified with regard to their behaviour to late blight. Their genetics of resistance and their suitability for hybridization are discussed. A report is given concerning the results of the testing of selected hybrid clones for the interval 1947-1948. [Authors' summary.]—Max-Planck-Institute for Research in Plant Breeding, Voldagsen/Hanover, Germany.

699. HOLMBERG, G.

Jämförande fältförsök med tidiga kräft-immuna potatissorter. (Comparative field trials with early potato varieties resistant to wart disease.)

*Växtskyddsnotiser*, 1950, No. 3, pp. 38-44.

The yields obtained from several early potato varieties resistant to wart disease, including Early Puritan and Irish Cobbler, are compared. Data of 6 years' trials, which were carried out on different soils, are tabulated.

700. TORKA, M.

II. Breeding potatoes with resistance to the Colorado beetle.

*Amer. Potato J.*, 1950, 27: 263-71, bibl. 27.

1. A short historical review is given pertaining to the European researches on the host-insect relations and on the phenomenon of resistance in wild species of *Solanum*. 2. The methods for testing and selection of resistant wild species and hybrid clones are also described. 3. A list of tested wild species, together with their behaviour towards the beetle, is given. 4. The behaviour of  $F_1$  hybrids of different wild species and of hybrids of *S. chacoense*  $\times$  *S. tuberosum* and of *S. tuberosum*  $\times$  *S. polyadenium* (4n) is described. [Author's summary.]—Max-Planck-Institute for Research in Plant Breeding, Voldagsen/Hanover, Germany.

701. ANTIPOVA, L. K.

Resistance of potato to *Epilachna*. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 8, pp. 34-6, illus.

*Epilachna vigintioctomaculata* Mtsch. is causing very serious damage, not unlike Colorado beetle damage, to potatoes in the Soviet Far East, particularly in forest areas. In 1949 observations were made on a collection of wild species, interspecific hybrids and cultivated varieties grown from tubers, and on wild species, and interspecific hybrids grown from seed. The results of these observations indicate that *Epilachna* resistance exists among the wild species, and that some interspecific hybrids with *Solanum demissum* were particularly promising.



702. GRAF, A.  
Pfropfversuche mit Kartoffeln. (Grafting experiments with potatoes.)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 112-15, bibl. 1.

In order to test Lysenko's experiments on tomatoes and to explore the possibility of vegetative hybridization for breeding purposes, two potato varieties widely differing in their characteristics were grafted on one another. The resulting plants showed specified changes in the shape and colour of flower, leaf and tuber. It remains to be seen whether the hybrid character is transmitted to the plants arising from these tubers.—Bundesanst. f. Pflanzenbau. u. Samenprüfung, Vienna.

703. LEBEDEVA, N. A.  
Changing the chromosome number by grafting. [Russian.]  
*Agrobiologija* (Agrobiology), 1949, No. 3, pp. 183-6, illus.

Grafting one variety of *Solanum* on another produced changes in the morphology and in the chromosome number of the scion. In one example, with *S. punae* grafted on the potato variety Ballidun (Ballydoon), the chromosome number of the scion varied from 52 to 62, compared with 48 in the control.

### Propagation and planting.

(See also 1226.)

704. PORUCKIĭ, G. V.  
The effect of the method of cutting tubers on the flowering and tuber formation in potatoes. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 63: 757-60, bibl. 17 [received 1950].

Experiments show that the apical and the basal eyes on cut potato tubers are physiologically different, the former producing plants which develop at a more rapid rate and give higher yields of tubers than plants derived from basal eyes.

705. PEUCKIĭ, F.  
Preparing potatoes for planting. [Russian.]  
*Kolhoz. Proizv.* (Collective Farming), 1950, No. 4, p. 42.

Vernalization before spring planting is recommended. It is said that in this way poor tubers can be recognized by their weak, thin sprouts, and can be discarded. Large tubers gave higher yields when cut just before planting than when cut 8 days before planting or when the cut surfaces were covered with ashes.

706. RUBIN, B. A., GLUŠČENKO, I. E., AND SÁVELJEVA, O. N.  
The biochemical characteristics of genetically different tissues of potato. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1950, 72: 733-5, bibl. 8.

It is stated that experiments show that adventitious buds in potatoes give rise, as a rule, to plants which produce more starch than plants from tubers not derived from such buds, and that this character is maintained in vegetative propagation. It is claimed that this result is of a genetical character and that improved forms can thus be obtained. Data in support of this contention are given for a white (tuber) form

derived from an adventitious bud of the coloured variety Zarnica (Zarnitza).

707. FLOVIK, K.  
Forsøk med ulike setteedybder for poteter. (Planting depth trials with potatoes.) [English summary 1½ p.]  
*Forskn. Landbruk*, 1950, 1: 59-73, being *Meld. Stat. Forsøksk. Høst, Tromsø*, 18.

The experiments were carried out for a period of several years on a fertile sandy soil in a comparatively wet climate at a latitude of about 70°. In the case of all 4 varieties tested—Up-to-Date among them—a planting depth of 4 cm. gave better results than 0, 8 and 12 cm., the average relative yields being of the ratio 100, 94, 91 and 71. The data show that under the unfavourable conditions of the far north any deviation from the optimum depth of planting results in an appreciable loss, while further south initial delays are made up more readily during the longer growing season.

708. SEVENSTER, S.  
Structuurbederf bij het zaaïen en poten op de lichtere gronden en hoe dit te voorkomen. (Damage to soil structure on light soils through sowing potatoes, and how to prevent it.)  
*Maandbl. LandbVoorlD.*, 1950, 7: 142-3, from abstr. in *Soils and Ferts*, 1950, 13: 2031.

A potato planter with two sets of adjustable discs (to work 2 rows at once) was used which filled the holes with fine moist soil, leaving a slight ridge between the rows for hoeing. Potatoes thus planted grew more quickly and regularly. Early planting is generally desirable.

709. BURAKOV, JA. N.  
Increased potato yields. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 67-8.

A method of potato cultivation, resulting in considerable yield increase, is described. The field when prepared for seeding received 30-35 tons of compost per ha; the tubers were planted at the beginning of May, after 30-35 days vernalization, 35 cm. apart in rows spaced 70 cm., using 20 cwt. of seed material per ha. Soon after planting, an application of 4 cwt. of wood ashes and 2 cwt. of bird manure was given, followed by a second application when the tubers began to form.

### Cultivation and nutrition.

(See also 479, 483, 750, 1221, 1222.)

710. RUSSELL, E. W.  
The relation between soil cultivation and crop yields.  
*A.R. Rothamsted Exp. Stat. for 1949, 1950*, pp. 130-47.

Soil cultivation studies have been in progress since 1926. The results of the first eleven years' work were summarized in *Ibid.* for 1936; results obtained since then are summarized here. *The effect of hoeing potatoes, sugar beet and lettuce:* The three sets of experiments at Rothamsted and Woburn show that an extra hoeing,

by killing quite small weeds, can sometimes give a striking increase in crop. With potatoes the main effect of weeds seemed to be competition for water, and with sugar beets for nitrogen; at Woburn the yield of beet was sometimes little affected by weeds if adequate N was supplied. With lettuce, addition of N did not compensate for the harmful effect of weeds. In no case was there clear evidence that hoeing had any benefit apart from its weed-killing action. *The effect of earthing up potatoes on their yield:* Three years' results at Rothamsted are tabulated. The effect of earthing up on yield, whether on a sandy or heavy loam soil, has been small, but the decrease in greened potatoes has been 15 cwt. or more per acre in each year. These trials only partially confirm earlier results obtained on light sandy soil at Ottershaw Park. Good yields obtained in the Rothamsted trials from the use of chaffed straw mulch with little cultivation and no earthing up are noted. *Other experiments:* Other trials reported concerned the effect of the tilth of the seedbed on the yield of barley, and various tillage experiments on several crops. The latter include six years' trials on potatoes with ploughing at 6 in. and 12 in. and differential manurial treatments. The results suggest that the more favourable the manurial conditions are, the more benefit potatoes are likely to derive from deep ploughing. Deep ploughing has also helped to keep some weeds, notably thistles, under control.

711. GODOY, C., Jr.  
Cultura da batatinha. A amontoa. (*Earthing up potatoes.*)  
*Rev. Agric. Piracicaba*, 1949, **24**: 357-76, bibl. 11.

The pros and cons of earthing up potatoes are reviewed. In order to determine the effect of date and frequency of earthing up under Brazilian conditions, 4 experiments were carried out at the Luiz de Queiroz School of Agriculture. The results indicated that earthing up was necessary as a protective measure. The best time was found to be 7 days after the completion of sprouting; in a rainy season this resulted in a 27% increase in yield and a lower percentage of small tubers, while in a dry season it had at least no detrimental effect. Earthing up 21 days after sprouting was prejudicial to yield. In no case were 2 or 3 earthings up superior to a single earthing up carried out 7 days after the completion of sprouting.

712. Foss, H.  
Forsøk med forskjellige mengder og sammensetninger av kunstgjødsel til et 8-årig omløp. (*Trials with different quantities and mixtures of artificial fertilizers in an 8-year rotation.*) [English summary 3½ pp.]  
*Forskn. Landbr.*, 1950, **1**: 91-229, bibl. 8, being *Meld. Stat. Forsøksk. Løken* 33.

Fertilizer trials with potatoes and agricultural crops were carried out at the State Experiment Farm, Løken, in the mountains of Norway and on some farms in the neighbourhood. Where 8 tons of farm manure per 1,000 m<sup>2</sup> were applied to potatoes in the first year of an 8-year rotation, the increase in yield from additional applications of artificial fertilizers was small. This increase was associated with a slight decrease in dry

matter content and it was produced at a cost of about 20 øre (=3d.) per kg. dry matter. Where 6 tons of manure were applied in the first year, the increase in yield resulting from artificial fertilizers was shown to be chiefly due to N. Absence of P or K in the mixture caused a reduction in yield, especially in the second period of the rotation.

713. WADE, G. C.  
**Potato fire blight.**  
*Tasm. J. Agric.*, 1950, **21**: 211-15, bibl. 8, illus.

The so-called "fire-blight" of potatoes, particularly the variety Brownell, in Tasmania is due to potassium deficiency. The symptoms are bronzing of the leaves, rapidly followed by the death of the portion of the leaf around the margin and between the main veins. Affected plants die off prematurely and the yield is reduced. It can be controlled by applying 1 cwt. of a potassium fertilizer per acre.

714. MACGILLIVRAY, J. H.  
**Effect of irrigation on the production of white potatoes.**  
*Amer. Potato J.*, 1950, **27**: 10-23, bibl. 32, illus.

In irrigation experiments conducted for three seasons the yield of potatoes was increased greatly by irrigation under the climatic conditions of Davis, in California. An application of 30 to 35 inches of water produced maximum yields. The non-irrigated potatoes produced a smaller percentage of No. 1s, were smaller in size, and usually had fewer knobs. The irrigated potatoes were usually of higher water content, had a smaller percentage of nitrogen, and exhibited large, whitish lenticels. [From author's summary.]

715. HOUGHAND, G. V. C.  
**An improved technique for growing potatoes in solution cultures.**  
*Amer. Potato J.*, 1950, **27**: 257-62, bibl. 2, illus.

A modified solution culture method, devised by the author, suitable for use both under glass and in the open, is described. In view of the high degree of nutrient control possible with this method and the excellent growth attainable, several new lines of investigation can be pursued.—U.S.D.A., Beltsville, Maryland.

### *Composition.* (See also 58.)

716. TERMAN, G. L., CARPENTER, P. N., AND JUNKINS, S. C.  
**Nutrient content of potato plants as affected by fertilizer treatment and other factors.**  
*Proc. Soil Sci. Soc. Amer.* 1949, 1950, **14**: 137-42, bibl. 12.

The dry matter content of potato stalks decreased with increasing applications of N, P and K and increased with age of the plant. High K and Cl content also resulted in a lower starch content of the tubers. The nutrient content of potato stalks is influenced markedly by stage of growth, year of sampling, variety, rate of fertilization, soil fertility level and many other factors. Interpretation of the nutrient



content is more difficult with well-fertilized plants than with plants showing symptoms of a nutrient deficiency. —Maine agric. Exp. Stat.

717. PROKOŠEV, S. M., AND SABELYEVA, O. N.  
Citric acid in the potato. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 62:  
117-20, bibl. 8 [received 1950].

In potato stems the citric acid content is 4-10 times less than in leaves and young tubers, calculated on the dry weight. In old leaves it is less than in young tubers, calculated on fresh weight, but, as the solids in the leaves are less than in the tubers, the citric acid content of the leaves, calculated on the dry weight, is about the same or even greater than that of the young tubers. In cut stems and tubers, when exposed for a short time in air, the citric acid content is decreased by 12-25%, suggesting that the citric acid is made use of in the process of wound respiration of the plant tissues.

718. PROKOŠEV, S. M., AND PETROCENKO, E. I.  
The mutual correlation between protein and ascorbic acid in potato tubers. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 61:  
313-16, bibl. 7 [received 1950].

The development of ascorbic acid in potato tissues as a result of injury is regulated by the requirements of the cells for this substance. This need is connected with a change in the structure of the plasmic proteins and protein exchange; the change in the protein complex is primary, with the biosynthesis of ascorbic acid as a result.

719. HILTON, R. J., AND EVANS, W. D.  
Factors in relation to tuber quality in potatoes. I. Penetration force and electrical resistance.  
*Sci. Agric.*, 1950, 30: 343-9, bibl. 11, illus.

1. The desirability of more satisfactory technique for measuring tuber density in Irish potatoes is discussed. Tubers of several varieties whose density has been calculated by the brine immersion method were subjected to penetration force and electrical resistance tests. 2. Measurement of tuber quality by means of a fruit maturity gauge (fitted with a 5 mm. plunger), showed a specific gravity/penetration force correlation of  $r=0.226$ , and this was not significant. A total of 196 penetration force readings were made. 3. Sections from 59 tubers, taken in such a way as to be as representative as possible of internal composition, were used in electrical resistance measurements. An ohmmeter was used and readings were expressed in 1,000 ohms per cm. length of core. A correlation  $r=0.008$  showed no indication of a relationship between tuber density and electrical resistance. [Authors' summary.]

720. MOEWUS, F.  
Gebundener und freier Wuchsstoff in der Kartoffelknolle. (Bound and free growth substance in the potato tuber.)  
*Z. Naturforsch.*, 1948, pp. 135-6, from abstract in *Ber. wiss. Biol.*, 1950, 68: 321.

If the expressed juice of the potato is treated with pancreatin the growth substance content of the juice increases from 0.1  $\gamma$  cm.<sup>3</sup> to 10  $\gamma$  cm.<sup>3</sup>  $\beta$ -indoleacetic acid. In the potato only 1% of the growth substance is in free, unbound form.  $\beta$ -indoleacetic acid added

to the expressed juice will be inactivated by heating, but can be again set-free, i.e. become active, through pancreatin. O.J.

# Virus diseases.

(See also 768 I, 1237.)

721. FERNÁNDEZ VALIELA, M. V., AND CARRANZA, J. M.  
Verificación de sanidad con respecto a virus en papas. (Testing potato stocks for freedom from virus.)  
*Idia*, 1950, 3: 31: 13-19, bibl. 9, illus.

In order to determine the best areas for seed potato production in the Argentine, the Plant Pathology Laboratory, Delta, and the Experimental Station, Balcarce, intend to plant up possible areas with virus-free stock and estimate the degree of infection that occurs after 5 years' continuous production. The methods of testing the plants for virus infection by inoculation are described. Results of preliminary tests indicate the present state of health of 3 varieties grown in the Balcarce region. Katahdin showed a high degree of freedom from virus, but was found to be a carrier of virus X, infected plants rarely exhibiting symptoms. White Rose was 100% infected with virus X. Huinkul M.A. showed a very low degree of infection and may prove to be a resistant variety.

722. GÄUMANN, E.  
Über den Einfluss der Bodentemperatur auf die Symptomausprägung bei der Blattrollkrankheit der Kartoffeln. (The influence of soil temperature on the appearance of symptoms of leaf roll of potatoes.)  
*Phytopath. Z.*, 1950, 16: 479-82, bibl. 8.

Within the range 9-35° C. the soil temperature has no effect on the intensity of symptom expression of leaf roll in potato plants. Under such conditions the young tubers which develop from infected plants themselves produce diseased plants. No connexion could be traced between the appearance of spraing disease and the presence of leaf roll plants in the previous crop.

723. LADEBURG, R. C., LARSON, R. H., AND WALKER, J. C.  
The ringspot type of potato virus X.  
*Amer. Potato J.*, 1949, 26: 432-5, bibl. 6.

A brief study and description of symptoms produced by this virus in solanaceous and some non-solanaceous plants.—Wisconsin agric. Exp. Stat., Madison.

724. LARSON, R. H.  
The spread of ringspot virus X by cutting knife.  
*Amer. Potato J.*, 1950, 27: 53-4, bibl. 8.

Evidence was obtained of the transmission of a clear ring strain of potato virus X by the cutting knife. This was particularly evident when sprouted eyes were cut.—Wisconsin agric. Exp. Stat., Madison.

725. KÖHLER, E.  
Über das Vorkommen des Tabak-Ringfleckenvirus bei Kartoffeln. (The occurrence of the tobacco ringspot-virus in potatoes.)  
*NachrBl. dtsch. PflSchDienst.*, Braunschweig, 1950, 2: 146-7, bibl. 5, illus.

The appearance of the tobacco ringspot virus on potatoes in Germany may be due to the development of a virulent strain of the virus on tobacco, which has been grown more widely during and since the war. Brief supplementary observations with illustrations are added by Dr. Körner.

726. BERCKS, R.

Über die X-virus-Verseuchung des Nachbaues von primärfinfizierten Kartoffelpflanzen. (Virus-X infection of the progeny of primarily infected potato plants.) *NachrBl. dtsh. PflSchDienst., Braunschweig*, 1950, 2: 147-9, bibl. 8, illus.

When examining the progeny of potato varieties Flava, Capella and Früherle, artificially infected with various strains of virus-X, it appeared that an early infection of the mother plants produced a considerably higher percentage of diseased tubers (up to 100%) than did a late infection. The resistance of older haulms to virus-X infection observed earlier was thus confirmed. The origin of the virus strains also influenced the degree of the infection, which varied again with variety.

727. BERCKS, R.

Fortgeführte serologische Untersuchungen über das X-Virus in Kartoffelpflanzen. (Further serological investigations of the X-virus of potatoes.) *Phytopath. Z.*, 1950, 16: 491-507, bibl. 8.

The practical importance of being able to identify primary virus disease in potatoes by serological methods is shown from results obtained with 9 varieties. After early infection the virus travels relatively rapidly to all parts of the plant. Flava-X and Sabina-X multiplied in the variety Flava more quickly than did Erstling-X. Taking into account the possible exceptions and particularly the incomplete extension of the virus throughout the plant, the evaluation of freedom from disease must be made only after testing all the shoots. In early diagnosis in the open temperature variations have no significance. The testing of 5 varieties when ripening off clearly showed the presence of the virus in the yellow leaves.

*Fungous and bacterial diseases.*

(See also 406, 698, 699, 767, 768d, j, m, 1222.)

728. GRAINGER, J.

Forecasting outbreaks of potato blight in West Scotland. *Trans. Brit. mycol. Soc.*, 1950, 33: 82-91, bibl. 2.

Results from the disease phenology plots at the Department of Plant Pathology, West of Scotland Agricultural College, Auchincruive, Ayr, have been used to confirm Beaumont's general premises (*H.A.*, 18: 2785), to make them more accurate for the west of Scotland, and to discuss practical implications of the use which might be made of such forecasts within the area. For the five years from 1944 to 1948 forecasts were all valid after the last days of June and were not valid before that time. The effect of foliage blight upon overall yield cannot yet be specified with accuracy, but forecasts would be useful for protective sprays used to diminish the spread of blight to the tubers. The amount of blight appearing naturally on the tubers is

greatest when the disease develops slowly on the foliage.

729. BLACK, W.

Inheritance of resistance to blight (*Phytophthora infestans*) in potatoes: strain C and its relationships. Reprinted from *Proc. roy. Soc. Edin. Sect. B*, 1950, 64: 216-28, bibl. 11.

Two specialized strains of *Phytophthora infestans*, B and C, are both more virulent than the common strain A. Each probably arose from strain A by mutation. Strains B and C are representatives of two distinct groups, within each of which only differences in degree of virulence appear to exist. Most new strains examined were members of the B group. The following genes in the host are postulated as controlling resistance: Rb, conferring resistance to strains A and B; Rc conferring resistance to strains A and C; Rbc conferring resistance to strains A, B and C. Each gene is independent of the other in producing its effect, and is inherited independently in simple Mendelian fashion.

730. HÄNNI, H.

Beitrag zur Biologie und Bekämpfung der Kraut- und Knollenfäule der Kartoffel, verursacht durch *Phytophthora infestans* (Mont.) de By. (The biology and control of the rot of potato haulms and tubers caused by *Phytophthora infestans*.) *Phytopath. Z.*, 1949, 15: 209-332, bibl. 172, illus.

Although mainly a biological study of the potato blight fungus in the laboratory, observations on outbreaks in the field and the use of copper sprays for control are described.

731. BEHR, L.

Über den Einfluss von narkotisch wirkenden Stoffen auf die Wundperidermbildung und die Resistenz der Kartoffelknolle gegenüber *Phytophthora infestans* de By. und Vertretern der Gattung *Fusarium* Lk. (The effect of narcotics on wound periderm development and the resistance of potato tubers to *Phytophthora infestans* and *Fusarium* spp.) *Phytopath. Z.*, 1950, 15: 407-46, bibl. 55, illus.

Under the action of narcotics the capacity of potato tubers to produce periderm under an injured surface is reduced. The affected tissues are still alive, however, and show normal plasmolysis and deplasmolysis, but the reaction to injury fails. The limits of effective concentrations are the same for the phytophthora-resistant form W and the susceptible varieties. It was found that for the alcohols tested in liquid form, in immersion tests, the values were: methyl 0.41, ethyl 0.051, n-propyl 0.034, and n-butyl 0.022 mol. The narcotic limit for chloroform vapour was 0.17 c.c. per litre of space. The resistant W tubers submitted to the influence of alcohol and chloroform become less resistant to infection by *Phytophthora*, and also by the facultative parasites of the genus *Fusarium* which cause tuber rot. The diminution of resistance caused by the 4 alcohols tested and by chloroform can be explained by the theory that under the influence of



narcotics the development of the protective fungicidal substance ("phytoalexine") is restricted.

732. ANDRÉN, F.  
Besprutningsförsök mot potatisbladmögel  
1949. (Trials on potato blight control,  
1949.)  
*Växtskyddsnotiser*, 1950, No. 2, pp. 19-23,  
illus.

Tabulated results of spraying trials at Nyckelby and Åkarp present data on the effect of some proprietary copper sprays on potato yield and leaf and tuber blight incidence in comparison with bordeaux mixture and untreated controls.

733. HOOKER, W. J., BUCHHOLTZ, W. F., AND  
COE, D. M.  
You can whip potato blight.  
*Ia Fm Sci.*, 1950, 4: 188-9.

Four years' tabulated results on the effect of 11 of the newer fungicides on potato yields and defoliation in blight and no-blight years in comparison with bordeaux and no treatment.

734. TRAVERSI, B. A.  
Fusariosis de papa. (Fusarium wilt of  
potatoes.)  
*Idia*, 1950, 3: 31: 20-2, illus.

The pathogenicity of several species of *Fusarium* was investigated at the Institute of Plant Protection, Buenos Aires. With soil inoculation, *F. oxysporum*, *F. solani* var. *eumartii* and *F. culmorum* all caused death of potato plants within a week at a temperature of 27-8° C. Higher or lower temperatures reduced the degree of infection although this effect was less marked with *F. oxysporum*. With tuber inoculation, symptoms appeared within a week, *F. culmorum* producing symptoms more slowly than the other 2 species. Variety No. 13 exhibited some resistance to attack, while Katahdin, White Rose, Sequoia and Huinkul were more susceptible. The effects of temperature were the same as those occurring with soil inoculation. 10- and 20-day-old inoculated shoots died in 1 or 2 days, 30- and 45-day-old shoots in 3 or 4 days, *F. solani* causing death most quickly. A histological examination showed that *F. solani* produced serious tylosis of the vessels. Tylosis was also sometimes observed in plants infected with *F. oxysporum*, but never with *F. culmorum*. Evidence of the presence of a toxic substance in the fungi was demonstrated by the fact that tomato plants placed in extracts of *F. solani* var. *eumartii*, *F. culmorum* and *F. oxysporum* showed signs of wilting in 40 minutes, 1 hour and 2½ hours respectively.

735. GOULD, C. J., AND RANDALL, T. E.  
Potato tuber disinfection tests in Western  
Washington.  
*Amer. Potato J.*, 1950, 27: 249-56, bibl. 3.

Tests confirm results of earlier work, that disinfection of seed potatoes is often uneconomical. *Fusarium* decay was not encountered in these tests; in stocks where its presence is known or suspected a disinfectant should probably be used. Mercury oxide (1 lb. in 30 gal.), Semesan Bel (1 lb. in 7½ gal.) and Ziram (1 lb. in 50 gal.) are suggested.

736. MENZIES, J. D.  
Potato scab control with calcium compounds.  
Abstr. in *Phytopathology*, 1950, 40: 968.

When soil was made alkaline with sodium carbonate and then treated with calcium compounds, scab control was best with calcium sulphate and almost as good with calcium oxide, but no control was obtained with calcium carbonate.

737. VÄXTSKYDDSANSTALT, STOCKHOLM.  
Potatiskräftan i Sverige. (Potato wart  
disease in Sweden.)  
*Flygbl. Växtskyddsanst.* 91, 1950, pp. 8,  
illus., being *Flygbl.* 74, 1945, revised.

Dealing with distribution of the disease in Sweden (illustrated by a map), the mode of its spread, immune varieties, control, and regulations concerning notification and indemnification. [See also *H.A.*, 17: 1449 and 19: 1352, 2262.]

738. BONDE, R.  
Factors affecting potato blackleg and seed-  
piece decay.  
*Bull. Me agric. Exp. Stat.* 482, 1950, pp. 31,  
bibl. 32, illus.

An account of potato blackleg and seed-piece decay [*Bacterium phytophthorum*] with particular reference to the sources of infection. The rôle of insects in disseminating the disease is described. Epidemics are sometimes associated with lengthy storage of the cut seed under unfavourable conditions. Seed planted immediately or soon after being cut or stored under cool, well-ventilated conditions rarely produces the disease in northern Maine.

739. HOLLIS, J. P., AND GOSS, R. W.  
Factors influencing invasion of potato by  
*Erwinia carotovora*.  
*Phytopathology*, 1950, 40: 860-8, bibl. 5.

Heating freshly harvested tubers under infra-red lamps until the tissue reached a temperature of 42° C. at a depth of 10 mm. did not predispose tubers to invasion by *E. carotovora*, and when such tubers were cooled in air to room temperatures before inoculation the rotting was less than in unheated tubers. When tubers were heated in water to 42° C. the rot was greater than in unheated controls, and when such heated tubers were cooled in air the rotting was less than when cooled in water.

## Nematodes.

(See also 768i.)

740. PETERS, B. G.  
Potato root eelworm.  
Reprinted from *Roy. Lancs agric. Soc.*  
*annu. J.*, 1949, pp. 7.

Potato root eelworm, *Heterodera rostochiensis*, is described as a serious and easily-spread pest. Control measures are discussed under rotation with non-susceptible crops (any crops except potatoes and tomatoes), and by avoiding the unnecessary spread of the eelworm on implements and boots.—Rothamsted exp. Stat.

741. VAN DEN BRUEL, E.

Le nématode doré de la pomme de terre, *Heterodera rostochiensis* Wollenweber. (The potato root eelworm.)  
Rev. Agric. Brux., 1950, 3: 123-36, bibl. 10, illus.

The life history of *Heterodera rostochiensis* and its effect on the potato plant are reviewed. So far, no economical nematocide has been evolved that destroys all the viable cysts in the soil. Crop rotation is recommended on contaminated fields, no potatoes or tomatoes being planted for at least 5 and preferably 7-8 years. Infested crops must never be used as seed potatoes.

742. VÄXTSKYDDSANSTALT, STOCKHOLM.

Potatisålen. (The potato eelworm [in Sweden].)

Flygbl. Växtskyddsanst. 90, 1950, pp. 4, being Flygbl. 51, 1940, revised.

The distribution of the potato eelworm in Sweden is shown on a map. Control measures are discussed.

743. AHLBERG, O.

Undersökningar över potatisnematoden *Heterodera rostochiensis* Woll.\* II. Cystornas storlek och ägginnehåll samt nematodernas beroende av yttre förhållanden och deras inverkan på potatisplantornas knölbildning. (A study of the potato eelworm *H. rostochiensis*. II. Size and egg content of the cysts and the influence of nematodes on potato tuber formation as affected by environmental factors.) [English summary 3½ pp.]  
Medd. Växtskyddsanst. Stockh. 55, 1950, pp. 56, bibl. 19.

Data and diagrams showing the effect of nematodes on potato yields over a period of several years are of interest. As a simple means of expressing the degree of soil infestation the author has adopted a measure, the so-called "cyst sum", which is obtained by adding the sum of all full cysts found in 1 l. of soil to half the sum of those cysts from which larvae have begun to escape. The experimental results show that even a low frequency of nematodes in the soil has a considerable effect, a cyst sum of 80, for instance, causing a reduction in yield of about 65%. Under Swedish conditions manuring had no beneficial influence if the cyst sum exceeded 200-300, but soil treatment with D-D brought about an improvement without actually reducing infestation. In extensive trials with 9 varieties no difference in tolerance to eelworms was discovered.

744. JAŠČUK, A. P., AND TEREŠČENKO, E. F.

Control of potato stem nematode. [Russian.]  
Sad i Ogorod (Orchard and garden), 1950, No. 8, pp. 32-4.

Eelworms causing considerable damage to potatoes in the Ukraine are spread by infected planting material. Various soil disinfectants tested gave no satisfactory control, but propagation of eelworm-free seed potatoes and correct timing of planting and harvesting seem to offer a solution. By selecting early-harvested seed tubers from summer plantings it is possible under favourable circumstances to obtain healthy planting material within 1-2 years.

\* For Part I, see *Ibidem*, 29, 1939.

Insect pests.

(See also 700, 701.)

745. ADAMS, J. B., AND KELLEY, R. A.

Potato aphid control studies, 1946-1949, at Woodstock, N.B., Canada.  
Amer. Potato J., 1950, 27: 175-82, bibl. 1.

It was found possible to control aphids on potatoes and considerably increase yields by the application of DDT emulsion sprays, but even with the 99% control thus achieved there was no significant reduction in leaf roll. It is suggested that the control of leaf roll spread by aphids can only be effected either by breeding a variety resistant to aphid feeding, and preferably resistant to leaf roll itself; by developing a systemic insecticide without toxicity to the tubers; or by seeing that all potato planting is done with clean seed and that an insecticide with the efficiency of DDT emulsion is used on all potatoes over a wide area.

746. BACYLEV, E. G.

Colorado beetle control. [Russian.]  
Sad i Ogorod (Orchard and garden), 1950, No. 6, pp. 68-70, illus.

To prevent the penetration of Colorado beetle into the U.S.S.R. the usual control measures of interception at airports, frontier railway stations and in ports, with wide publicity and reporting finds, are practised. When the beetle is found, the district is put in quarantine and extensive measures are taken to exterminate it. Soil disinfection with dichlorethane or carbon disulphide is recommended.

747. HEINZE, K.

Saugschäden durch Weich- oder Blindwanzen (*Capsidae*) an Kartoffeln und Rüben. (Injury by capsids to potatoes and beets.)  
NachrBl. dtsh. PflSchDienst., Braunschweig, 1950, 2: 138-40, illus.

Except during a severe drought, potatoes were found not to be seriously affected by an infestation of *Lygus pratensis*.—Biol. Zentralanst. Berlin-Dahlem.

748. LALL, B. S.

Preliminary observations on the bionomics of potato tuber moth (*Gnorimoschema operculella* Zell.) and its control in Bihar, India.  
Indian J. agric. Sci., 1949, 19: 295-306, bibl. 10.

The moths are not carried over to the next crop in the seed tubers; they fly out from potato stores in September and settle on brinjal and tomato plants before transferring to the new potato crop. Thirteen broods were noted within a year, eight in store and five in the field. Control was effected by dipping the potatoes in 5% phenyl solution for 15 minutes, by using a covering material of sand and garlic bits, and by hanging a paraffin oil trap in the store. Potatoes harvested before mid-February are not infested. C.W.S.H.

749. ANDERSON, L. D., AND REYNOLDS, H. T.

Potato tuberworm control in Southern California.

J. econ. Ent., 1950, 43: 396-7, bibl. 2.

Two applications of insecticide dusts at 40 lb. per acre were made at a 6-day interval. 5% DDT, 5% DDD, 10% toxaphene, and 1.5% lindane gave 97% to 100% control of the potato tuberworm, *Gnorimoschema*



*operculella*. Some slight, though not objectionable, off-flavour was noted when the potatoes from the lindane treatment were sampled.

750. LLOYD, N. C.  
Hilling to control potato moth in tableland potato crops.

*Agric. Gaz. N.S.W.*, 1950, 61: 409-14, bibl. 4, illus.

The results of experiments described show that, while disc hilling has invariably reduced tuber infestation by the potato moth (*Gnorimoschema operculella*), it has sometimes also reduced the total yield of tubers, so that the yield of clean tubers has often been no greater in the hilled than in unhilled plots.

751. GIBSON, K. E., AND LANDIS, B. J.  
Control of the iris whitefly on potatoes.

*J. econ. Ent.*, 1950, 43: 394-6, bibl. 2.

DDT applied as a dust gave the best control among several insecticides tested to control the iris whitefly, *Aleyrodes spiraeoides*, attacking late potatoes grown under irrigation in Washington.

752. RAWLINS, W. A., AND DAVIS, A. C.  
Recent progress in the control of wireworms on potatoes.

*Amer. Potato J.*, 1950, 27: 151-8, bibl. 13.

Six soil insecticides, crude and refined BHC, chlordane, compound 118, heptachlor and compound 497 were compared. The results obtained were generally promising. Much more work on flavour contamination is, however, necessary before any of them can be recommended for commercial use.—Cornell University, Ithaca, N.Y.

753. RAWLINS, W. A., BRIANT, A. M., AND DAVIS, A. C.  
Chlordane found effective for wireworm control.

*Down to Earth*, 1950, 6: 1: 4, illus.

Applications of 5 to 6 lb. of chlordane per acre effectively reduced wireworm infestation of potatoes in three seasons.

### *Effects of insecticides on potatoes.*

754. STARNES, O.  
Absorption and translocation of insecticides through the root system of plants.

*J. econ. Ent.*, 1950, 43: 338-42, bibl. 5.

Beans, peas, corn, tomatoes and potatoes were grown in the greenhouse and field in soil containing specific concentrations of insecticides. Observations were made to determine whether the germination, growth and yield of plants were affected. The plants were infested with suitable insect species as a qualitative indication of the presence of a toxicant in the plant tissue. Bio-assays were made with the aid of *Aedes* larvae. Potatoes grown in soil containing 10 lb. per acre of the  $\gamma$ -isomer of BHC were retarded in sprouting and growth, the retardation increasing proportionally with higher concentrations. Further evidence on the presence of BHC in potato tubers and foliage, and in the soil at harvest time is presented. Bioassay tests and chemical analyses of potatoes have also shown the persistence of parathion.—N.J. agric. Exp. Stat.

755. HARVEY, M. H., GREENWOOD, M. L., AND TURNER, N.

The effectiveness of certain antidotes in counteracting the off-flavor in potatoes grown on soil treated with benzene hexachloride.

*Amer. Potato J.*, 1950, 27: 182-8, bibl. 2.

Of the following compounds tested at the Connecticut Agricultural Experiment Station, activated charcoal, alcoholic potash, lime-sulphur, ferric chloride and lime, only the activated charcoal counteracted the off-flavour in potatoes caused by BHC, without itself imparting an off-flavour.

756. MACLINN, W. A., REED, J. P., AND CAMPBELL, J. C.

Flavor of potatoes as influenced by organic insecticides.

*Amer. Potato J.*, 1950, 27: 207-12, bibl. 1.

Soil treatments with BHC, parathion, lindane and chlordane imparted off-flavours to potatoes. Dust and spray applications of parathion and DDT also seemed to affect the flavour.

757. SCHÖNHERR, K.-E.

Über die Geschmacksbeeinflussung von Speisekartoffeln durch Hexamittel. (The effect of BHC preparations on flavour in potatoes.)

*Nachr. Bl. dtsh. PflSchDienst.*, Braunschweig, 1950, 2: 135-7.

The new improved BHC preparations Viton N, Nexit N and Rapidin were found to produce little or no taint in potatoes, even when excessively high dosages were applied.—Staatl. Forschungslab., Freiburg i. Br.

758. LUBATTI, O. F., AND BLACKITH, R. E.  
Fumigation of agricultural products. II. Susceptibility of seed potatoes to the vapour of methyl bromide.

*J. Sci. Food Agric.*, 1950, 1: 240-4, bibl. 5.

The susceptibility of potato tubers to methyl bromide vapour has been measured by two criteria of damage: the loss of tubers rejected before setting, and the reduction of yield per viable tuber. Varietal differences are more clearly shown by the latter criterion, as expected, and less clearly by the former. The damage caused by raising the dosage above a critical level has on the contrary much less influence on the yield per viable tuber than on the loss by rotting in storage. This critical level fluctuates widely, probably seasonally. Tubers fumigated in the autumn are enabled to reverse much of the phytotoxic action of the fumigant and losses are much less severe than if the fumigation takes place in the spring immediately before planting. [Authors' synopsis.]—Imperial College Field Station, Silwood Park, Sunninghill, Berks.

### *Defoliant.*

759. RICH, A. E.

The effect of various defoliant on potato vines and tubers in Washington.

*Amer. Potato J.*, 1950, 27: 87-92, bibl. 9, illus.

Two years' results with various methods of killing potato vines are discussed. Most chemicals which

killed the vines rapidly also produced an objectionable xylem discoloration in the tubers. This was especially true of the phenol compounds. Ammonium sulfate killed the vines fairly rapidly when applied at the rate of 200 lb. per acre in 100 gal. of water. The xylem discoloration was not serious. Mechanical vine shredders are gaining in popularity and may replace chemicals as a means of hastening maturity. A survey showed a negligible amount of tuber discoloration as a result of this method of killing the vines. [Author's summary.]

### *Storage and sprout inhibition.*

(See also 768a, 992, 1216, 1221.)

#### 760. KREUTZ, W.

Merkblatt zur Mietenbehandlung. Verminderung von Mieten Schäden durch Steuerung des Mietenklimas. (The reduction of winter injury to potatoes by regulating the clamp climate.)

Mitt. dtsch. Wetterdienst. U.S. Zone 7, 1950, pp. 8, illus.

Climate regulation in clamps aims at (1) rapid cooling and drying of the tubers in autumn, (2) protection against frost in winter and (3) against heating in spring. The construction and ventilation of clamps providing for these requirements is discussed and illustrated. Temperature curves recorded in clamps during the severe winter of 1946/47 and during the mild winter of 1947/48 are reproduced—in the latter case with and without ventilation. Photographs illustrate the control of sprouting in a mild winter by means of ventilation.

#### 761. SOKOL, P. F.

Conditions of potato storage. [Russian.] *Sad i Ogorod* (Orchard and garden), 1950, No. 9, pp. 69-71.

General storage conditions are discussed and clamping between layers of earth in dug-outs is compared with cellar storage. Observations and tests in the Ukraine indicated that optimum conditions were obtained in clamps where access of oxygen from the air was limited, the moisture of the earth layers did not exceed 18-19%, and the temperature was kept at 1-3° C., though short spells at 7-8° did no harm.

#### 762. WERNER, H. O.

Effect of storage temperatures on Triumph seed potatoes used for the early crop in the south and in central Nebraska.

Res. Bull. Neb. agric. Exp. Stat. 162, 1949, pp. 47, bibl. 18.

Storage and planting tests were designed to determine the most suitable method of getting western Nebraska Triumph seed potatoes into proper condition for prompt and uniform growth in mid-winter when planted in the south or in early spring when planted in central Nebraska. The most satisfactory treatment for inducing prompt uniform growth was initial storage for 2 to 5 weeks at 40° F. (or in the humid cellar), followed by warm storage at 60°-65° for 2 to 4 weeks prior to shipment for planting. A short initial period of warm humid storage (about 2 weeks) retarded emergence only slightly, so that, because of its efficacy in healing wounds and preventing rots, it is to be considered not only a permissible but also a desirable

practice. The size of the plants throughout most of the growing period was generally proportional to the rate of plant emergence. It was found possible to produce sprouts on seed tubers at any desired stage of development for planting the mid-winter and spring crops. Generally, yields were greatest with lots of seed that emerged earliest. [From author's summary.]

#### 763. FRIEDMAN, B. A.

Behavior of potato internal brown spot in stored tubers.

Phytopathology, 1950, 40: 899-901, bibl. 2, illus.

No change was observed during storage in the numbers of tubers having internal brown spot or in the severity of the disorder. It appears unlikely that the presence of internal brown spot predisposes tubers to decay. [Author's conclusions.]—U.S. Dep. Agric., New York.

#### 764. HARDENBURG, E. V.

Effects of water submersion on seed value of potato tubers.

Amer. Potato J., 1950, 27: 142-50, bibl. 2, illus.

Trials at Ithaca, N.Y., indicate that in appraising possible damage to tubers by flooding, temperature of the water is the principal factor. No exact threshold was determined, but submersion at temperatures above 55-65° F. was found to cause fermentation and decomposition by bacterial action, thus rendering the tubers unfit for seed material.

#### 765. DOWNIE, W. A.

Prevention of sprouting in stored potatoes. Further studies.

J. Dep. Agric. Vict., 1950, 48: 301-6, illus.

A chlorinated nitro-benzene compound applied to the Snowflake variety completely prevented sprouting for at least 3 months. Sprouting was prevented also, to a substantial degree, in the varieties Katahdin, Early Carman, Sabago and Late Carman by that compound and by the methyl ester of alpha-naphthaleneacetic acid. Application as a dust is considered the most efficient; it should be performed as soon as possible after harvest, and before the advent of warm temperatures. Treated potatoes remain palatable, and do not blacken when cooked. [See also H.A., 20: 450.]

#### 766. MARSHALL, E. R., AND SMITH, O.

Effect of field and storage applications of sprout inhibitors on potato tubers.

Amer. Potato J., 1950, 27: 133-41, bibl. 8, being Pap. Dep. Veg. Crops, Cornell Univ. 330.

Field applications of sprout inhibitors, while promising, do not prohibit sprouting completely without severe injury to the tubers. The effect of the sodium salt of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) sprays was found to vary with variety and environment. There is a possibility that the addition of sprout inhibitors in storage after field treatment with non-injurious low concentrations may be satisfactory. It appears that 2,4,5-T sprays in the field will reduce field sprouting in some varieties during seasons when this is a problem. In storage applications testing three forms of 2,4,5-T and the methyl ester of alpha-naphthaleneacetic acid (MENA), the MENA was most effective in inhibiting



sprouting as a dust, the isopropyl ester of 2,4,5-T as a suspension and the sodium salt of 2,4,5-T when injected into the tubers with toothpicks. Investigations are being continued. [From authors' summary.]—Cornell University, Ithaca, N.Y.

767. MARTH, P. C., AND SCHULTZ, E. S.  
Effect of growth regulators on sprouting of stored table stock potatoes and on waste piles for control of diseases.  
*Amer. Potato J.*, 1950, 27: 23-32, bibl. 5, illus.

Results with certain growth regulators or dormancy treatments indicate that sprouting and subsequent development of late blight (*Phytophthora infestans*) on potato waste piles can be prevented if the cull potatoes are treated with dormancy treatments before or when the tubers are deposited on the cull piles. [Authors' summary.]—U.S.D.A., Beltsville, Maryland.

*Noted.*

768.  
a ALEXANDER, L. M., SCHOPMEYER, G. E., AND ANDERSON, R. B.  
Potato storage and quality of French fries. I. Katahdin.  
*Amer. Potato J.*, 1950, 26: 439-45, bibl. 8.  
b BAINS, G. S., AND HOWARD, H. W.  
Haploid plants of *Solanum demissum*.  
*Nature*, 1950, 166: 795, bibl. 3.  
c CASTRONOVO, A.  
Papás chilotas. Descripciones y clave para el reconocimiento de muestras de papa recogidas en una excursión al sur de Chile. (Potato varieties endemic in Chile. Descriptions of specimens collected on an expedition in south Chile, with an identification key [based on tuber characters].)  
*Rev. Invest. agric. B. Aires*, 1949, 3: 209-45, bibl. 26, illus.  
d CALLBECK, L. C.  
Late blight of potatoes and its control.  
*Publ. Canad. Dep. Agric.* 837 (Fmrs' Bull. 162), 1950, pp. 15, illus.  
e CORDON, T. C., AND OTHERS.  
Lactic acid from potatoes.  
*Industr. Engng Chem.*, 1950, 42: 1833-6, bibl. 30.  
f DEMEL, J.  
Kartoffelsortenversuche. (Potato variety trials [in Austria].)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 99-108.  
g DEMEL, J.  
Anbauversuch mit holländischen Kartoffelsorten. (Cultivation trials with Dutch potato varieties [in Austria].)  
*Bodenkultur*, 1950, 1st Sonderheft, pp. 108-12.

- h DODDS, K. S.  
Polyhaploids of *Solanum demissum*.  
*Nature*, 1950, 166: 795.  
i FENWICK, D. W.  
Investigations on the emergence of larvae from cysts of the potato-root eelworm *Heterodera rostochiensis*. 2. The form of the hatching curve. 3. Larval emergence in soil under the influence of potato-root diffusate.  
Reprinted from *J. Helmin.*, 1950, 24: 75-86, bibl. 4, and 86-90, bibl. 2.  
j GANDELMAN, C. S.  
The importance of summer planting of potatoes in the control of potato canker. [Russian.]  
*Sad i Ogorod* (Orchard and garden), 1950, No. 6, pp. 61-4.  
k KRANTZ, F. A.  
An analysis of some factors that might influence the volume of sales of small, medium, and large potatoes in a controlled experiment on consumer preferences.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 427-34, bibl. 1, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2495.  
l MENZIES, J. D.  
Purple-top-type viruses of potatoes in Washington.  
Abstr. in *Phytopathology*, 1950, 40: 968.  
m MENZIES, J. D.  
*Erysiphe cichoracearum* DC. as a parasite of potatoes.  
*Plant Dis. Repr.*, 1950, 34: 140-1, bibl. 15.  
n NYLUND, R. E., AND LUTZ, J. M.  
Separation of hollow heart potato tubers by means of size grading, specific gravity, and x-ray examination.  
*Amer. Potato J.*, 1950, 27: 214-22, bibl. 10.  
o PARKS, N. M.  
Procedure in introduction of new varieties of potatoes in Canada.  
*Amer. Potato J.*, 1950, 27: 55-8.  
p PEPPIN, S. G.  
Seed potato certification in Canada.  
*Amer. Potato J.*, 1950, 27: 93-6, being *Contr. Div. Plant Prot., Sci. Serv., Dep. Agric., Ottawa* 81.  
q SISAKJAN, N. M., AND KOBJAKOVA, A. M.  
Phosphorilase in isolated plastids. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 1065-7, bibl. 2 [received 1950].  
Data for potato, spinach, and nettle.  
r WERNER, H. O.  
Peeling economy as affected or influenced by size and grade of Triumph potatoes.  
*Amer. Potato J.*, 1950, 27: 97-113, being *Pap. J. Ser. Neb. agric. Exp. Stat.* 475.

## TOBACCO.

*General.*

769. COLLINS, J. C.

*A guide to prospective tobacco growers.**Rhod. agric. J.*, 1950, 47: 196-203.

Advice is given on types and classes of tobacco and market prospects in Rhodesia, the economics of tobacco production, areas of production and the points to look for when buying a farm. A table lists the number of tobaccos and of Turkish tobacco by districts in 1947/48. The great majority produce flue-cured Virginia, with Turkish next.

770. CLAYTON, E. E.

*Male sterile tobacco.**J. Hered.*, 1950, 41: 171-5, bibl. 3, illus.

*Nicotiana debneyi* and *N. tabacum* were crossed and the progeny systematically backcrossed with *N. tabacum* serving as the male parent throughout. A gradual male sterility, complete in the third generation, was produced. The process was repeated with the *N. megalosiphon* × *N. tabacum* cross. Male sterile tobacco may be of practical value in the production of hybrid seed. Also, it is possible that with some types of tobacco, male sterile crops might not require topping, since the primary purpose of topping is the elimination of seed production.—U.S. Dep. Agric., Beltsville, Md.

771. SMITH, H. H.

*Differential photoperiod response from an interspecific gene transfer.**J. Hered.*, 1950, 41: 199-203, bibl. 7, illus., being *Pap. Dep. Plant Breed. Cornell Univ.* 257.

Experimental results show that a recessive mammoth gene of *Nicotiana tabacum*, when transferred by the backcross method to an essentially complete genotype of *N. rustica*, produced a photoperiod response differing from that of the original parent species. [See also *H.A.*, 20: 1777.]

*Cultivation and nutrition.*

(See also 73, 1214, 1221, 1228, 1241.)

772. CIFERRI, R.

Studi sul biochimismo del tabacco. V. Trattamento auxinico di semi e crescita del tabacco. (The biochemistry of tobacco. V. Treating seed with auxin and the development of the plants.)

Reprinted from *Tabacco*, 1947, pp. 6, bibl. 6, collected in *Miscellanea Ist. bot. Univ. Pavia*, 1947-48.

Dusting the seed of tobacco var. Padano gigante with talc containing naphthaleneacetic acid and 3 indoleacetic acid at 1-15 p.p.m. (of seed weight) induced accelerated development and increased weight of seedlings at transplanting, but at maturity the differences had practically disappeared.

773. VOLKOV, I. A.

Treating the roots of plants with growth substances when transplanting. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1948, 62: 267-70, bibl. 4 [received 1950].

Immersing the roots of tomato and tobacco plants in solutions of synthetic growth substances at the time of transplanting to the open ground resulted in significantly higher yields. Of the substances tested,  $\alpha$ -naphthaleneacetic acid was the most effective.

774. HASLAM, R. J.

*Soil management and crop rotations for burley and dark tobaccos.**Lighter*, 1950, 20: 2: 11-18, from abstr. in *Soils and Ferts*, 1950, 13: 2050.

Soil fertility declined under a 3-year tobacco-maize-oats rotation, but an extension to 4 years by including mixed hay had beneficial results. Hay was more satisfactory than maize as a preceding crop for burley tobacco, which produced higher yields in rotations where maize followed instead of preceding it. A 3-year wheat—sweet clover—tobacco system gave high yields of tobacco, and 2 years under lucerne in longer rotations considerably improved soil fertility. On sandy loam no advantage was gained from rotations of more than 4 years. The relative merits of spring and autumn ploughing and of methods of fertilizer application are discussed. The response of tobacco to fertilizing the preceding crop was considerable where lucerne had received Ca cyanamide but very slight where rye had received  $(\text{NH}_4)_2\text{SO}_4$ .

775. GHOSH, B. P., AND BURRIS, R. H.

*Utilization of nitrogenous compounds by plants.**Soil Sci.*, 1950, 70: 187-203, bibl. 21.

Clover, tobacco, and tomato plants were grown aseptically to an age of 4 to 8 weeks on a variety of nitrogenous compounds. Clover and tomato showed considerable similarity in their response to organic nitrogenous compounds, and a number of amino acids supported excellent growth. Tobacco was much more sensitive to amino acids, and several inhibited the plant's growth. Organic nitrogen was not so effective as ammonia and nitrate in supporting growth of tobacco. When ammonia labelled with  $\text{N}^{15}$  and a single amino acid were supplied together to tobacco and clover plants, all the cultures assimilated ammonia readily. Analysis for the  $\text{N}^{15}$  content of clover and tobacco plants simultaneously furnished with  $\text{N}^{15}\text{H}_4^+$  and single amino acids indicated that usually the plant initially uses its reserve of seed nitrogen, then uses ammonia, and finally uses the nitrogen from the amino acids.—Univ. of Wisconsin.

776. HASLAM, R. J.

*Quality of burley may be affected by the nitrogen supply.**Lighter*, 1950, 20: 2: 18-19, from abstr. in *Soils and Ferts*, 1950, 13: 2052.

N requirements and deficiency symptoms in burley tobacco are discussed. The adverse effects of N excess are described. On clay loam soils a 2-12-10 fertilizer is recommended in conjunction with manure and clover or a 3-10-8 without manure and clover. On sandy and gravelly loams a 4-8-10 fertilizer is advocated. Under average conditions, applications of 800-1,000 lb. of fertilizer per acre are adequate.



777. RIBEIRO DOS SANTOS, S., AND FRAGA, C. G., Jr.  
Adubação para viveiro de fumo. Experiência preliminar em vasos. (The manuring of tobacco seedbeds. Preliminary pot experiments.) [English summary  $\frac{1}{2}$  p.] *Bragantia*, 1948, 8: 119-26, bibl. 5, illus. [received 1950].

The results indicated the value of phosphates in fertilizer mixtures for tobacco seedlings, the complete NPK fertilizer giving the best results.

### Composition.

(See also 795b, f, 1221, 1241.)

778. RYŽKOV, V. L., AND GORODSKAJA, O. S.  
The form of phosphorus in the leaves of healthy, mosaic-infected, and starved tobacco. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1950, 70: 105-8, bibl. 11.

In starved tobacco leaves the processes of mineralization of phosphorus go on and the ribose nucleic acid is used up. Mosaic disease and the accumulation of virus nucleoproteid are not accompanied by a uniform increase of phosphorus, nucleoproteids and nucleic acid. The ratio of nitrogen to phosphorus in the alkaline fraction from diseased tobacco leaves is higher than that from healthy leaves.

779. LAŠUK, G. I.  
The effect of transplantation [by grafting] on the synthesis of alkaloids in some species of *Nicotiana*. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1357-9, bibl. 8 [received 1950].

In experiments with 19 species of *Nicotiana* grafted on tomato, the scions, being deprived of roots, were unable to synthesize alkaloids.

780. LAŠUK, G. I.  
Modifying the dominance of the alkaloid content of interspecific hybrids of *Nicotiana*. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1950, 70: 265-8, bibl. 3.

The alkaloid of *Nicotiana tabacum* is nicotine, that of the wild species *N. glutinosum* and *N. sylvestris* nornicotine. In the hybrids obtained from crossing *N. tabacum* with either of those wild species the alkaloid of the leaves is nornicotine, nicotine being almost absent. Experiments are recorded to ascertain whether this dominance of nornicotine could be modified by grafting. *N. glutinosa* and *N. sylvestris* were grafted on *N. tabacum* and the pollen of the scions used to fertilize the flowers of the rootstock variety. The alkaloid content of the leaves of the hybrids obtained in this way was examined, and it was found that in these plants nicotine predominated, nornicotine being present in comparatively low amounts. These results are considered to support previous contentions by Mičurin and Lysenko that grafting modifies the sexual potentialities of the scion variety.

781. ILJIN, G. S.  
The formation of nornicotine in *Nicotiana* spp. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1948, 62: 247-50, bibl. 9 [received 1950].

In this study of nicotine and nornicotine in tobacco plants, *Nicotiana glutinosa* was grafted on tomato, on *N. tabacum* and on *N. glauca*, and vice versa. The results obtained indicate that nicotine is the source of nornicotine, which is thus often an accompanying alkaloid. Presumably nornicotine plants can transform nicotine into nornicotine; this property in nicotine plants is very slight, and nornicotine present in them is only an accompanying alkaloid.

### Diseases.

(See also 26, 795d, e, 1214, 1221, 1228, 1237.)

782. COSTA, A. S., AND FORSTER, R.  
Um enrolamento das folhas do fumo de causa genética. (A leaf-roll of tobacco induced by genetic factors.) [English summary  $\frac{1}{2}$  p.] *Bragantia*, 1949, 9: 43-5, bibl. 2, illus.

A type of leaf-roll that has been observed for many years in commercial tobacco plantings in the state of São Paulo, Brazil, has been proved to be due to genetic factors. It was thought that if the leaf-roll were due to the genetically controlled production of a hormone-like substance, it might be possible to induce the condition in normal plants by spraying the leaves with juice from affected plants or by grafting. Attempts to do so, however, have failed.

783. STEINBERG, R. A.  
The relation of certain soil bacteria to frencing symptoms of tobacco. *Bull. Torrey Bot. Cl.*, 1950, 77: 38-44, from abstr. in *Soils and Ferts*, 1950, 13: 2053.

It is suggested that diffusates from *Bacillus cereus* and perhaps other soil bacteria may cause frencing of tobacco in the field.

784. HILL, A. V.  
Yellow dwarf of tobacco in Australia. IV. Some host plants of the virus. *Aust. J. agric. Res.*, 1950, 1: 141-3, bibl. 3, illus.

Yellow dwarf of tobacco was transmitted by grafting to six species of the Solanaceae. The results of preliminary transmission experiments with the insect vector indicated that three commonly occurring weeds were probably autumn-spring host plants of the virus. [Author's summary.]—C.S.I.R.O.

785. HELSON, G. A. H.  
Yellow dwarf of tobacco in Australia. V. Transmission by *Orosius argentatus* (Evans) to some alternative host plants. *Aust. J. agric. Res.*, 1950, 1: 144-7, bibl. 3, illus.

Tobacco yellow dwarf virus disease was experimentally transmitted to 15 species of plants by the leafhopper, *Orosius argentatus* (Evans). Eight of these plants are summer annuals and seven are autumn-spring growing plants which provide a continuous succession and wide range of hosts. Their occurrence in the districts where tobacco is grown makes control by the elimination of alternative host plants appear impracticable. [Author's summary.]—C.S.I.R.O.

786. BLACK, L. M., MORGAN, C., AND WYCKOFF, R. W. G.

Visualization of tobacco mosaic virus within infected cells.

*Proc. Soc. exp. Biol. Med.*, 1950, 73: 119-22, bibl. 3, illus., reprinted in *Contr. Brooklyn bot. Gdn* 111, 1950, pp. 4.

Mosaic-infected tobacco leaves have been studied in very thin sections prepared (method described) for obtaining electron micrographs. These at magnifications of 8,000 to 9,300, indicate that the virus is often present in fibrous masses associated with chloroplasts which are severely affected. Virus may be seen in the cytoplasm of the diseased cells sometimes as single filaments. The nuclei seem unaltered by the infective process and have appeared free from virus. The great length of these filaments, much in excess of 2,800 Å, indicates an end to end arrangement of the rods *in situ*.

787. GRUŠEVOI, S. E.

The susceptibility of tobacco to black root rot. [Russian.]

*Agrobiologija* (Agrobiology), 1950, No. 2, pp. 75-82.

The physiology of parasitism is first discussed in general terms and then with special reference to black root rot of tobacco caused by *Thielaviopsis basicola*. Different varieties of tobacco showed differences in susceptibility to this disease and four groups are recognized, viz. (1) very resistant or immune under ordinary conditions, (2) resistant, (3) slightly susceptible or tolerant, (4) susceptible.

788. FULTON, R. W.

Bacteriophages attacking *Pseudomonas tabaci* and *P. angulatum*.

*Phytopathology*, 1950, 40: 936-49, bibl. 17, illus.

Two bacteriophages attacking both *Pseudomonas tabaci* and *P. angulatum* were isolated from wildfire- and blackfire-diseased tobacco. It is believed that they might reduce the spread of disease from heavily infected leaves, but that they were probably not a major factor in checking initial infection.—Wis. agric. Exp. Stat.

### Pests.

(See also 1214, 1222, 1228.)

789. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Insect pests of tobacco.

*Agric. Gaz. N.S.W.*, 1950, 61: 415-18, illus.

The most important pests of tobacco are the elephant beetle (*Listroderes obliquus*), cutworms (*Noctuidae*), the leaf-miner (*Gnorimoschema operculella*), the stem borer (*G. plaesiosema*), the camel grub (*Plusia* spp.) and bud-worm (*Heliothis armigera*). Control measures for these pests comprise, mainly, spraying or dusting with DDT; other measures (such as the use of poison baits in the seedbeds against elephant beetles and cutworms) are also desirable, but regular applications of DDT to seedbeds and field crops are essential.

790. DOMINICK, C. B.

Organic insecticides for control of green June beetle larvae.

*J. econ. Ent.*, 1950, 43: 295-8, bibl. 1.

The green June beetle larvae, *Cotinis nitida*, injure tobacco plants in the plant bed by burrowing and tunnelling. Experiments conducted in Virginia during 1948 and 1949 indicated that parathion, when applied to the upper 2 inches of soil at rates ranging from 1 to 4 lb. of 1% dust per 100 sq. yards, gave a highly effective control. Parathion applied to the soil with fertilizer prior to seeding was also effective. Inconsistent results were obtained, however, when the application was made at the same time as the standard weed control treatment. This insecticide also proved to be effective as a surface spray or dust when applied after seed germination. Lindane, aldrin, dieldrin, toxaphene, heptachlor and chlordane were all inferior to parathion. No plant injury was observed from any of the applications used.

791. ADAMSON, N. J.

Tobacco crops severely damaged by tobacco leaf miner.

*N.Z. J. Agric.*, 1950, 80: 313-14, illus.

This leaf miner (*Gnorimoschema operculella*) has recently caused much damage in tobacco fields in the Nelson area. General recommendations for its control include (1) ploughing in stalks as soon as possible after the tobacco harvest, (2) dusting the seedling beds with 2% DDT, and in the field dusting every week or 10 days.

792. JENKINS, W. A.

Root rot disease-complex causing tobacco plant bed failures in Pittsylvania County, Virginia.

*Plant Dis. Repr.*, 1950, 34: 177-8.

The symptoms are stunting of the plants, and etiolation and yellowing of the cotyledons. Two undescribed nematodes (*Panagrolaimus* spp.) were found in the roots of affected plants.

### Harvesting and processing.

793. BYERS, G. B., BORTNER, C. E., AND BACK, W. B.

Effect of maturity and priming of burley tobacco on yield, quality, and labor requirements of the crop.

*Bull. Ky. agric. Exp. Stat.* 552, 1950, pp. 28, illus.

Though burley tobacco is Kentucky's main cash crop, a very large proportion of it is produced on small-holdings. The experiments described here were made in 1945-47, primarily with these small farms in view, and the authors' main conclusions are: For harvesting unprimed tobacco the optimum time is after the mid-season, and prior to, mature harvest in normal seasons, and at the midseason stage of maturity in harvest seasons of excessive moisture. Maximum yield and income were obtained in 1945 and 1946 by 2 primings, i.e. the systematic removal of the lower leaves at the proper stage of ripeness, and in 1947 by 3 primings, although the third priming was uneconomical in some cases. In general, priming is considered economical for growers with 3 and less acres of burley.



794. PERUCCI, E.  
La fermentazione artificiale "a caldo" dei tabacchi subtropicali. (Artificial fermentation of sub-tropical tobaccos by the hot process.)  
*Tabacco*, 1949, 53: 339-51, 355-63, bibl. 5, illus.  
In a kind of silo by a system devised by the author and here described in some detail.

## Noted.

795.  
a CARIBBEAN COMMISSION.  
The tobacco trade of the Caribbean.  
*External Trade Bull. Caribbean Comm.* 4, 1949, pp. 211.  
Detailed tabulated information on both imports and exports.  
b CIFERRI, R., AND SCARAMUZZI, G.  
Dati odierni sulla nutrizione minerale del tabacco. (Present-day information on the mineral nutrients in tobacco plants.)  
Reprinted from *Tabacco*, 1947, pp. 5-20, collected in *Miscellanea Ist. bot. Univ. Pavia*, 1947-48.

Notes on 40 elements in relation to their presence in tobacco plants.

- c CRAWFORD, R. V., AND HILDITCH, T. P.  
The component fatty acids of tobacco-seed oils.  
*J. Sci. Food Agric.*, 1950, 1: 230-4, bibl. 10.  
d NAKATA, K., AND TAKIMOTO, S.  
A white strain of tobacco common mosaic. [Japanese, English summary.]  
*Ann. phytopath. Soc. Japan*, 1940, 6: 243-54, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (107) [received 1950].  
e NAKATA, K., AND TAKIMOTO, S.  
One instance of tomato ring mosaic (?) on tobacco. [Japanese.]  
*Agric. and Hort.*, 1940, 16: 401-10, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (106) [received 1950].  
f VICKERY, H. B., AND ABRAHAMS, M. D.  
The metabolism of the organic acids of tobacco leaves. III. Effect of culture of excised leaves in solutions of oxalate.  
*J. biol. Chem.*, 1950, 186: 411-16, bibl. 7.

## MISCELLANEOUS TEMPERATE AND TROPICAL CROPS.

## Drug plants.

(See also 401, 458, 595, 609, 836h, i, 1211.)

796. FROESCHEL, P., AND CLAEYS, R.  
Création de formes polyploides chez des plantes médicinales. (The creation of polyploid forms of medicinal plants.)  
*Biol. Jaarb. Dodonaea*, 1949, 16: 118-28, from abstr. in *Ann. Gembl.*, 1950, 56: 35.  
By treatment with colchicine, polyploid forms of *Atropa belladonna*, *Datura stramonium*, *Hyoscyamus niger* and *Digitalis purpurea* were obtained.

797. SOLIMAN, G., AND SALEH, W.  
Constituents of the seeds of *Corchorus olitorius* L. Part I. Corchorin and its identity with strophanthidin.  
*J. chem. Soc. Lond.*, 1950, pp. 2198-2200, bibl. in text.

Corchorin, the crystalline bitter principle of jute seeds, is isolated from the seeds of *Corchorus olitorius* L., and is shown to have the formula  $C_{23}H_{32}O_6$  and to be identical with strophanthidin. [Authors' synopsis.]—Farouk I Univ., Alexandria.

798. MARION, L.  
The papilionaceous alkaloids. VII. *Lupinus arboreus* Sims.  
*Canad. J. Res., Sect. B*, 1950, 28: 403-6, bibl. 5, being N.R.C. 2169.

*Lupinus arboreus* Sims has been found to contain two main alkaloids, *l*-sparteine and *d*-lupanine, together with a small quantity of *l*-lupanine. There may be present a trace of *d*-sparteine, but no other alkaloid could be detected. [Author's abstract.]

799. ROTHROCK, J. W., AND OTHERS.  
*Strophanthus aglycones*.  
*J. Amer. chem. Soc.*, 1950, 72: 3827-8, bibl. 4.

In a search for sources of sarmentogenin and other 11-oxygenated steroidal aglycones different species of *Strophanthus* were examined. The glycoside was found to reside almost exclusively in the seeds.

800. ANET, F. A. L., HUGHES, G. K., AND RITCHIE, E.  
A new *Strychnos* alkaloid.  
*Nature*, 1950, 166: 476, bibl. 2.

The isolation of strychnospermine from *S. psilosperma* leaves and the formula of the alkaloid are discussed.—Sydney University.

## Essential oils.

(See also 836a, i, j, 923, 996, 1211.)

801. (LA FACE, D.)  
Essential oil of *Acacia farnesiana*.  
*Manuf. Chem.*, 1950, 21: 378.

The characteristics are given of the essential oil extracted from the flowers of *Acacia farnesiana* grown in Reggio Calabria, Italy, and a comparison is made with Ligurian oils. The article is based on a paper by D. La Face in *Helvetica Chimica Acta*, 1950, 33: 249.

802. KALINKEVIČ, M. I.  
The effect of potassium on the accumulation of essential oils in the leaves of camphor basil. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1363-5, bibl. 10 [received 1950].

In water cultures of *Ocimum canum* it was found that

reducing the concentration of potassium increased the percentage of essential oil in the leaves.

803. ANON.

**Geranium oil.**

*Drug and Cosmetic Ind.*, 1950, 66: 30, from abstr. in *Econ. Bot.*, 1950, 4: 242.

Geranium oil is used in perfumery. The main sources of supply are French North Africa and Reunion Island near Madagascar. Some production figures are given.

804. LEVAC, C.

**La culture de la menthe. (The culture of peppermint.)**

*Rev. d'Oka*, 1949, 23: 124-47, bibl. 43.

Canada imports, on an average, 51,200 lb. of peppermint and spearmint oil from the United States each year. From a study of the soil and climatic requirements of *Mentha piperita*, it is concluded that Canada could well supply her own market with this commodity, and that a potentially profitable industry could be established in Quebec. This conclusion is supported by the results of trials held at Sainte-Clotilde, Chateauguay. The methods of culture, harvesting and extraction of oil practised in the mint-growing areas of the United States are described in some detail, and notes are given on the more important pests and diseases.

805. LIEBEL, L. N.

**Peppermint oil; an economic study.**

*Pop. Bull. Wash. St. agric. Exp. Stats* 199, 1950, pp. 25.

The total acreage planted to peppermint in the U.S.A. was 47,400 in 1947, the highest yield per area being achieved in Washington, where average oil production amounted to 55 lb. per acre. The bulletin presents the results of a study on many aspects of the industry in Washington, including the cultural practices adopted, the machinery used, rotation crops, manuring and weeds. Production costs and other economic problems are discussed in some detail.

**Fibres.**

(See also 836b, 1211, 1241.)

806. KIRBY, R. H.

**Brush-making fibres.\***

*Econ. Bot.*, 1950, 4: 243-52.

An informative report on the origin and uses of a number of fibres, amongst which are: piassava; Mexican fibre (ixtle, istle, tuba, Tampico fibre, Tampico hemp and lechugilla fibre); palmyra fibre or bassine; coco fibre; kitool; broom root; and gomati fibre. Several of these fibres, while having one commercial name, come from various plants and often from different parts of the world.

807. GEORLETTE, R.

**Utilisation industrielle des genêts. (Industrial utilization of broom plants.)**

*Ann. Gembl.*, 1950, 56: 111-12, bibl. 13.

Broom has long been used as a source of fibre in Italy, and its value has sporadically been investigated in France and England. In 1946 it formed the basis of a new textile industry in France, *Spartium junceum* and

*Sarothamnus scoparius* being the species chiefly utilized. The fibres are long, more resistant than those of flax and almost as warm as carded wool. Plantings of broom are useful in preventing erosion on hillsides and will enrich the soil with nitrogen. By-products of the industry include papier-mâché from the wood and the alkaloid spartein.

**Gums and resins.**

(See also 836o.)

808. MANTELL, C. L.

**The natural hard resins—their botany, sources and utilization.\***

*Econ. Bot.*, 1950, 4: 203-42.

Accroides, Congo, damar, boea, elemi, kauri, mastic and other commercially valuable resins, which are exudations of a variety of trees and shrubs in many parts of the world, are discussed in this paper.

**Herbs and condiments.**

(See also 836g, m.)

809. GLUŠČENKO, N. N.

**Changing biennial caraway into an annual. [Russian.]**

*Agrobiologija* (Agrobiology), 1949, No. 5, pp. 135-8.

From a biennial population of caraway (*Carum carvi*) annual forms were obtained by selection and by changing the date of sowing. Seeds sown 6 May yielded 86.9 to 89.1% stemmed plants, seeds sown 20 August 0.0 to 1.8%. The percentage of annual plants increased from 0.0% in the original population to 81.0% in the  $F_4$  generation.

810. KRISHNA MENON, K.

**The survey of pollu [hollow berry disease] and root diseases of pepper.**

*Indian J. agric. Sci.*, 1949, 19: 89-136, bibl. 19, illus.

This is not only a survey of pollu and root disease but is an exhaustive account of black pepper, *P. nigrum*, cultivation in south-western India. Climate, botany, varieties, propagation, cultivation, manuring, yield, and pests and diseases are described and discussed. The distribution of the plant in India shows that it can be grown from sea level to 3,500 ft. with a rainfall of 50-80 inches or more, and with a temperature range of 50°-104° F. Propagation is by means of cuttings and other vegetative methods, and although there are numerous varieties none has so far been produced by plant breeding. Cultivation experiments have not been undertaken, but manurial experiments have shown a ready response to lime, P and K and, to a lesser extent, to N. Live supports are used, though in other countries "dead" posts have been found satisfactory. Root diseases are sporadic and deaths in some years are much higher than in others. It is suggested that breeding for varietal resistance would be more effective than direct methods of control. Pollu, or hollow berry disease, presents a complex problem

\* Being a summary of three books: C. L. Mantell and others, *The technology of natural resins*, 1942, pp. 506; F. N. Howes, *Vegetable gums and resins*, 1949, pp. 188; and C. L. Mantell, *The water-soluble gums*, 1947, pp. 279.



in which the fungus *Colletotrichum*, two insects and possibly physiological "spike shedding" are concerned. It is considered that improved cultural and manurial practices and breeding for resistance will be the best methods of control. C.W.S.H.

### Hops.

(See also 109n, 836f, 1214, 1221, 1225, 1232, 1233.)

811. SALMON, E. S.

Thirty-third report on the trial of new hop varieties.

[Publ.] *East Malling Res. Stat., Kent*, 1950, pp. 13, 1s.

In spite of the effects of drought, 6 of the 86 new varieties tested cropped at the rate of over 20 cwt. to the acre. The number of bushels of green hops required to the cwt. of dried hops varied from 77 to 134. In general, a higher preservative value (P.V.) was given than in the previous year. "John Ford Hop" (WFA 90) gave 10.74% and "Northern Brewer" (WFB 135) 9.52%  $\alpha$ -resin; in the late varieties, OM 26 gave 11.05% and "Brewers' Gold" (C9a) 10.65%  $\alpha$ -resin. As usual, the bud-sport OM 26 of "Nonsuch Hop" (OB 53) proved to be richer than its parent, the increase in 1949 being 0.75%  $\alpha$ -acid and 0.61%  $\beta$ -resins. The crop of new varieties marketed by registered growers is recorded. Particulars are given of the distribution to growers of the two new varieties resistant to *Verticillium* wilt, "Keyworth's Midseason" and "Keyworth's Early". A favourable report is published of brewing trials made with Ref. No. OT 48, another new variety which has shown resistance to *Verticillium* wilt.

812. GEORLETTE, R.

Considérations sur la morphologie des cônes de quelques variétés de houblon. (The morphology of the cones of some varieties of hops.)

*Ann. Gembl.*, 1950, 56: 69-81, bibl. 15, illus.

An attempt to discover certain morphological characters of the cone that could be used in the identification of hop varieties led to the conclusion that the morphological characters are so inconstant that they have little taxonomical value. Only anatomical and genetical studies, it is thought, could help to clear up the confusion concerning the identity of varieties. Morphological data are presented, however, on 12 hop varieties grown at the Esschene Station of the National Belgian Hop Institute.

813. HOED, F., AND ELSOCHT, P.

Rapport sur les travaux aux Stations de l'Institut national belge du Houblon, à Esschene (Brab.) et à Poperinge (Fl. Occid.) en 1948. (Report on the work of the stations of the National Belgian Hop Institute at Esschene (Brabant) and Poperinge (Western Flanders) in 1948.)

*L'Écho de la Brasserie*, 1949, 5, Nos. 29, 31, 33, 34, 37, 38, 41, 44, from abstr. in *Ann. Gembl.*, 1950, 56: 27-8.

A report of manurial and plant protection trials and variety studies carried out at these two newly established hop research stations in Belgium. [For a fuller account see abstract 1225.]

814. GOLUBINSKIĬ, I. N.

The effect of soaking hop cuttings before planting on the chemical composition and yield of the hop cones. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 135-7, bibl. 12 [received 1950].

Data are presented to show that soaking hop cuttings in water for 12 days before planting increases the yield and the percentage of resins in the cones. Other effects are stated to be an earlier and more favourable growth of shoots in spring, and more vigorous development of roots and rhizomes.

815. BONNET, J., AND COPPENS, R.

L'absorption des éléments nutritifs par le houblon. (The absorption of nutrients by hops.) [Flemish, German and English summaries 2 or 3 lines each.]

*Bull. Inst. agron. Gembloux*, 1950, 18: 21-32, bibl. 1.

The analyses and observations started in 1941 with a view to determining the nutrient requirements of hops [see H.A., 18: 2037] were continued during 1949. In addition to the varieties previously examined, new varieties raised at the Esschene Research Station were included in the study. Detailed results are tabulated, and absorption curves presented. Analyses confirm earlier observations that absorption of nutrients is most active during July and early August, and that nutrient requirements vary widely with the different varieties. Lime was found to play an important part in fertilizer applications.

816. YARWOOD, C. E.

Spraying upper vs. lower leaf surface in control of hop mildew.

Abstr. in *Phytopathology*, 1950, 40: 971.

In tests with the hop downy mildew, *Pseudoperonospora humuli*, leaves sprayed on the upper surface and artificially inoculated on the lower were heavily infected, but left to natural infection they were almost free from infection. Leaves sprayed on their lower surface only were free from natural or artificial infection.

### Insecticidal plants.

(See also 1211, 1229.)

817. PROESCHEL, A.

Contribution à l'étude de légumineuses à principes actifs: plantes à sparteine, plantes à rotenone. (Contribution to the study of leguminous plants containing active principles: sparteine and rotenone.)

Thèse Fac. Pharm. Univ. Strasbourg, 1938, pp. 99, bibl. 45, illus. [received 1950].

In the first part of this thesis a review is given of the chemical composition and uses of sparteine-containing lupins and brooms, and of methods used for estimating the alkaloid content. A new and rapid technique for estimating sparteine is described. Results of chemical analyses of samples of *Lupinus pilosus* Murr. var. *tassiliensis* Marie, a species obtained from Senegal, indicate that this would make a useful forage plant. In the second part, the culture of the rotenone plants, *Derris*, *Lonchocarpus* and *Tephrosia vogelii*, is described, and their chemical composition and toxicity are discussed. Observations are made on the distribution and content of the secretory cells of *Derris* and some

other rotenone plants. A method of rotenone estimation perfected by the author is described. Roots of *Derris elliptica* grown in Indochina were found to be considerably less rich in rotenone than roots of *Derris malaccensis*. It is suggested, however, that the rotenone content might be increased by suitable cultivation methods. It was found that the roots of *Lebeckia retamoides* and the pods of *Parkia africana* did not contain rotenone, but there are indications that they may contain another insecticidal principle.

## 818. CHIU, S. F.

Effectiveness of Chinese insecticidal plants with reference to the comparative toxicity of botanical and synthetic insecticides.

*J. Sci. Food Agric.*, 1950, 1: 276-86, bibl. 59.

The effectiveness of nine species of Chinese insecticidal plants has been tested against 40 species of insects. The toxicity of three species, namely, *Milletia pachycarpa* Benth., *Tripterygium forrestii* Loes. and *Rhododendron molle* G. Don, was studied in detail. The rotenone-bearing plants, *M. pachycarpa*, *Pachyrrhizus erosus* Urban and *Derris fordii* Oliv., are stomach- as well as contact-insecticides. The finely-ground seeds of *M. pachycarpa*, when applied as sprays in suspension, were highly effective against aphides, pentatomids and leaf-beetles. The root bark of the wrinkle-fruited thunder-god-vine, *T. forrestii*, contains an alkaloid and other unknown toxic principles. Data obtained from laboratory and field tests show that the root bark of this plant acts as a powerful repellent and as a stomach-insecticide. When applied as a dust it was found to be effective in protecting vegetables from the attack of leaf-beetles and certain species of lepidopterous larvae. The toxicity of the root bark of the bitter tree, *Celastrus angulata* Maxim., is similar to that of *Tripterygium*, but it appeared to act also as a contact-poison. The root of *Stemona tuberosa* Lour. is a contact-poison, and alcohol extracts were effective against body lice and plant lice. The stems and rhizomes of the black hellebore, *Veratrum nigrum* L., are a stomach- and a contact-poison; it is used by farmers for house-fly control. The flower of *Rhododendron molle* was found to be a contact- and stomach-poison. Its toxicity is very specific, being effective only against certain species of lepidopterous larvae, pentatomids and leaf-beetles. The root of *Stellera chaemesiasme* L. contains an active antibiotic principle which acts also as a repellent and as a contact-poison against tent caterpillars. The toxicities of insecticides of vegetable origin were compared with modern synthetic insecticides under laboratory conditions. As a contact spray against the cruciferous leaf-beetle, *Colaphellus bowringi* Baly,  $\gamma$ -benzene hexachloride appeared to be more toxic than rotenone, but rotenone was about four times more toxic than technical DDT and its killing action was more rapid than that of  $\gamma$ -benzene hexachloride or DDT. *Milletia pachycarpa*, *Pachyrrhizus erosus*, *Tripterygium forrestii*, *Celastrus angulata*, *Rhododendron molle* and *Veratrum nigrum* are widely distributed in China and have great possibilities for extensive cultivation as an easily available source of cheap insecticide. These insecticidal plants have no phytotoxic effect and with the exception of *Rhododendron* and *Veratrum* they are not very toxic to human beings. [From author's synopsis.]

## 819. NATTRASS, R. M.

Pyrethrum wilt in Kenya caused by *Sclerotinia minor*.

*E. Afr. agric. J.*, 1950, 16: 53, bibl. 1.

*Sclerotinia minor* causes sudden wilting and drying up of pyrethrum leaves. It spreads by extension of the mycelium to adjacent plants and by transference of sclerotia during cultivation. The disease is sporadic, and wet weather and poor drainage favour it.

C.W.S.H.

## Rubber plants.

(See also 836d, k.)

## 820. U.S. DEPARTMENT OF AGRICULTURE, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY.

List of publications and patents with abstracts pertaining to research on natural rubber, 1944-1949.

[Publ.] *U.S. Dep. Agric. AIC-276*, 1950, pp. 8.

Research on natural rubber in the Bureau of Agricultural and Industrial Chemistry, U.S. Department of Agriculture, has been conducted in three places in recent years: The Eastern Regional Research Laboratory, Philadelphia, Pa, the Southern Regional Research Laboratory, New Orleans, La, and Natural Rubber Extraction and Processing Investigations, Salinas, Calif. The main crops concerned are guayule, golden rod, cryptostegia and kok-saghyz. Abstracts are given of 42 papers issued by these laboratories on the extraction, processing and chemistry of rubber from these plants.

## 821. GASTROCK, E. A.

Natural rubber from goldenrod possible with new process.

*Res. Achiev. Sht U.S. Dep. Agric. R.A.S.* 133(C), 1950, pp. 2, bibl. in text.

An outline is given of an extraction process evolved during 1943-44 at the Southern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry. Goldenrod rubber can be blended with hevea or synthetic rubber, and in an emergency could be substituted for the former.

## 822. OZEROV, G. V.

The influence of the leaves, rooting medium, and the time of cutting on the recovery of guayule cuttings. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1950, 72: 805-7.

Guayule cuttings planted with 0, 2 and 4 leaves rooted and grew equally well in three different media: water, sand, and clay soil. Plants with leaves developed more slowly than those without. Cuttings should be taken in the second half of October; if taken earlier, food reserves are likely to be depleted and the plants become more subject to diseases. Propagation by cuttings is recommended for the more valuable varieties of guayule.

## 823. TAYLOR, C. A., and BENEDICT, H. M.

Stimulation of growth in guayule by etiolation.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 438-40, bibl. 1, illus.



Guayule (*Parthenium argentatum*) plants which had all their stems darkened by burying the plants with dry soil or gravel, made greatly stimulated growth. Shoots of the treated plants were as much as ten times the length of shoots from untreated plants. [Authors' summary].—U.S. Dep. Agric., Salinas, Calif.

824. BENEDICT, H. M.

Factors affecting the accumulation of rubber in seedling guayule plants.

*Bot. Gaz.*, 1950, **112**: 86-95, bibl. 14.

Guayule, *Parthenium argentatum*, seedlings of strains 593 and 4265 were grown to an age of about 6 months in 2 levels of light intensity, soil moisture, temperature and available N, and various combinations of these conditions. The dry weights, sugars, levulins, inulin, pentosan, resins and rubber content of the plants were determined. Dry weight of the plants and percentages of determined constituents were generally higher in full light than in shade. The relative effectiveness of the various factors in altering rubber percentage, arranged in descending order, were: light intensity, temperature, soil moisture, and available N. It would appear that the various compounds in the plants are formed more or less independently of one another. No evidence was obtained in these tests that seedlings of strain 4265 grow more rapidly or produce more rubber than do those of strain 593.—Natural Rubber Research Station, Salinas, Calif.

825. OZEROV, G. V.

The effect of nitrogen, phosphorus and potassium on the growth of guayule seedlings. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, **68**: 601-3, bibl. 6.

Guayule seedlings were grown in sand cultures with Knop's nutrient medium as control and the same medium with different amounts of K, N, and P. It was found that increasing N or P enhanced growth but that increasing K depressed it.

826. ADDICOTT, F. T., AND ROMNEY, V. E.  
Anatomical effects of *Lygus* injury to guayule.

*Bot. Gaz.*, 1950, **112**: 133-4, bibl. 3, illus.

Observations carried out on guayule, *Parthenium argentatum*, support the idea that *Lygus hesperus* in its feeding injects a toxic material into the host. Longitudinal growth after a few days of *Lygus* feeding ceases through the death of the terminal meristem, the young leaves and much of the phloem near the stem tip. The toxin is, however, not highly virulent as is shown by the restriction of the injuries to the area of feeding and by the eventual development and growth of lateral buds close to the stem tip.—Special Guayule Research Project, Salinas, Calif.

827. PETROVA, O. A.

A chemical method of cleaning kok saghyz seeds when mixed with those of dandelions not containing rubber. [Russian.]

*Priroda* (Nature), 1949, No. 11, pp. 56-8, bibl. 4, illus.

It has been found that the seed of kok saghyz is relatively much less sensitive to the caustic action of alkalis than that of other dandelions, and that the method can be used for germinating its seeds free or

nearly free from other species of *Taraxacum*. The different effects of treating the seed of kok saghyz and of *Taraxacum brevicorniculatum* with 5% NaOH for 1½ hours are illustrated.

828. POPOV, A. V.

Some peculiarities of the biology of germination of kok saghyz seed. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1949, **68**: 609-11, bibl. 1.

It is shown that untreated seeds of kok-saghyz have two optimal temperatures for germination, one about 5°, the other about 25° C., but this peculiarity does not obtain after "stratification" (moistening the seed and then holding it for 20-30 days on melting ice).

829. STAPP, C.

Bakterielle Erkrankungen der Kautschukpflanze *Taraxacum Kok-Saghis*. (A bacterial disease of the rubber-producing plant *Taraxacum kok-saghyz*.)

*Phytopath. Z.*, 1949, **15**: 73-8, bibl. 11.

A bacterium isolated from the roots of plants of kok-saghyz showing soft rot was found to be a form of *Bacterium phytophthorum*.

### Tannins.

830. BROWN, J. G., AND BOYLE, A. M.

Canagire leaf spot.

*Plant Dis. Repr.*, 1950, **34**: 178, bibl. 2, illus.

A leaf spot of canagire, *Rumex hymenosepolus*, occasionally grown in Arizona and elsewhere on account of the tannin content of the root, is caused by *Ovularia canagirecola*. Spraying with bordeaux mixture is suggested for control.

### Vegetable oils.

(See also 90, 295, 795c, 836e.)

831. SELLSCHOP, J. P. F.

Agronomic and industrial requirements of some oil-bearing seeds.

*Commun. afr. reg. sci. Conf.*, Johannesburg, **B(h)6**, 1949, pp. 4.

The importance of vegetable oils and proteins in human nutrition is reviewed, and the suggestion made that greater emphasis should be placed on oil-bearing seeds for their proteins rather than for their oil alone. South Africa is still largely dependent on imports, and suggestions are made for expanding the cultivation of oil-bearing crops, amongst which are mentioned: Conophor (*Tetracarpidium conophorum*), tung, linseed, safflower, castor and soya beans for drying oils, and groundnuts, sunflower and maize for edible oil. Among several indigenous perennials only Mafura (*Trichilia emetica*) is used locally.

832. KANEHIRA, R.

On "Ais", an oil-yielding plant from Micronesia. [Japanese.]

*J. Jap. Bot.*, 1940, **16**: 471-5, illus., from abstr. in *Jap. J. Bot.*, 1941, **11**: (96) [received 1950].

"Ais" (*Parinarium glaberrimum*) is a medium-sized tree that grows on several of the islands of Micronesia

in the South Pacific. It is here described and illustrated. An account is given of the preparation and uses of the oil obtained from the fleshy cotyledons.

833. XABREGAS, J. L.

*A Thevetia neriifolia* Juss. como oleaginosa. (*Thevetia neriifolia* Juss. as an oil plant.) [English and French summaries  $\frac{1}{2}$  p. each.] *Agron. angol.*, 1950, 3: 121-32, bibl. 13, illus.

The importance of exploiting new oil-producing plants in Angola is discussed, and *Thevetia neriifolia*, the yellow oleander, is suggested as a potentially valuable species. Previous work on the chemical composition of the seed has shown it to contain a commercially useful toxic principle and to be the source of a new insecticide. The author's own analyses of the seed show that the kernel contains 62% oil suitable for soap manufacture or lubrication. The pomace contains 6.7% nitrogen, 3.3% phosphorus and 1.8% potash, and would therefore make a useful fertilizer. At present the plant is too sparsely scattered in Angola to be exploited commercially, but plantations on the dry, sandy soils round the capital might be profitable.

*Other crops.*

834. MONTEIRO, R. F. R.

*Oxytenanthera abyssinica* Munro. Um bambú africano. Subsídios para o conhecimento do seu valor na indústria da celulose. (*Oxytenanthera abyssinica*, an African bamboo. Its value in the cellulose industry.) [French and English summaries  $\frac{1}{2}$  p. each.] *Agron. angol.*, 1949, 2: 59-73.

The results of chemical analyses of the stem of this bamboo, and a study of the most suitable methods of preparation of the cellulose indicate that the final product and the required lixiviation conditions are very similar to those of other plants used in the cellulose industry. It produces a paste that can be bleached economically and is rich in alpha cellulose. Further technological studies are required finally to determine its commercial possibilities.

835. KOIZUMI, T., AND KAKUKAWA, T.

On the vitamin C (ascorbic acid) content of herbaceous plants and marine algae, considering factors influencing it. *Sci. Reps Tôhoku imp. Univ.*, 1940, 15: 105-20, from abstr. in *Jap. J. Bot.*, 1941, 11: (60) [received 1950].

The quantity of vitamin C contained in leaves of more than 50 species of green plants and a few marine algae was determined. It was found that ascorbic acid was present more abundantly in the reduced than in the oxidized form, especially in shade plants. The vitamin C content of the leaves was proportional to the intensity of light to which they were subject.

*Noted.*

836.

- a ANTIA, M. B., AND KAUSHAL, R.  
Essential oil from the flowers of camphire or henna plant.  
*Curr. Sci.*, 1950, 19: 284, bibl. 1.

- b BOYER, J.  
Le kudzu, merveilleuse plante fourragère, textile et alimentaire. (Kudzu, a valuable forage, fibre and food plant.) *Vie rustique*, 1949, 14: 402-4, from abstr. in *Ann. Gembl.*, 1950, 56: 99.
- c GANGULI, P. M.  
Rhea [*Boehmeria nivea*] cultivation in Assam.  
*Indian Fmg*, 1950, 11: 157.
- d GERSTEL, D. U., AND MISHANEC, W.  
On the inheritance of apomixis in *Parthenium argentatum*.  
*Bot. Gaz.*, 1950, 112: 96-106, bibl. 22, illus.
- e GRACE, N. H., LIPS, H. J., AND ZUCKERMAN, A.  
Canadian erucic acid oils. V. Physical, chemical, and edible properties of oil from weed seed screenings.  
*Canad. J. Res., Sect. F*, 1950, 28: 401-11, bibl. 10, being *Pap. Canad. Cttee Fd Pres.* 250, and *N.R.C.* 2220.
- f GREAT BRITAIN, PARLIAMENT.  
The hops marketing scheme, 1932(a) (as amended by the Hops Marketing Scheme (Amendment) Orders, 1934(b), 1939(c), 1945(d), 1948(e), 1949(f) and 1950(g). *H.M. Stationery Office, Kingsway*, 1950, pp. 22, 6d.
- g HARDY, S. K.  
Harvesting and processing culinary herbs. *Brooklyn bot. Gdn Rec.*, 1950, 6: 149.
- h HILLS, K. L., AND RODWELL, C. N.  
The recombination of some varietal characters in the opium poppy.  
*Aust. J. agric. Res.*, 1950, 1: 118-31, bibl. 4.
- i KIRJALOV, N. P.  
The basic component parts of the essential oil of Labrador tea, *Ledum palustre* L. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 305-8, bibl. 5 [received 1950].  
An analytical study particularly with reference to palustrol.
- j KIRJALOV, N. P.  
The formation and composition of the essential oil of *Ledum palustre*. [Russian.] *Priroda* (Nature), 1949, No. 11, pp. 53-4, bibl. 2.
- k LUKIN, N.  
Drills for sowing kok-saghyz in holes. [Russian.] *Kolhoz. Proizv.* (Collective Farming), 1950, No. 3, p. 35, illus.



- i MACLEAN, D. B., MANSKE, R. H. F., AND MARION, L.  
The alkaloids of *Lycopodium* species. XI. Nature of the oxygen atom in lycopodine: some reactions of the base.  
*Canad. J. Res., Sect. B*, 1950, 28: 460-7, bibl. 8, being N.R.C. 2188.
- m MALAGUTI, G., AND PONTIS V., R. E.  
El "tizón" o "mildew" del pimienta en Venezuela. (Mildew of pimienta [*Phytophthora capsici*] in Venezuela.)  
*Agric. venezol.*, 1950, 14: 141: 4-5, illus.
- n PAIVA CASTRO, G., AND CORREIA, F. A.  
Algumas determinações físicas e químicas da fibra de rami. (Some results of physical and chemical tests with ramie fibres [in Brazil].) [English summary  $\frac{3}{4}$  p.]  
*Bragantia*, 1948, 8: 109-17, bibl. 11 [received 1950].
- o PIGULEVSKIĬ, G. V., AND KUZNECOVA, G. A.  
Investigating the secretion of the resin ducts of the roots of *Prangos pabularia* Lindley. [Russian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 309-11, bibl. 3 [received 1950].

## FLORICULTURE.

### General.

(See also 99, 102, 224, 373, 1013, 1018.)

837. CARRIER, L. E., AND SNYDER, W. E.  
The effect of a starter solution on several nursery and florist crops.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 513-16, bibl. 7.

Forsythia, delphinium, snapdragon and *Taxus cuspidata* plants were treated with 25 c.c. of a starter solution on being transferred to a soil which was low in available nutrients. The solution consisted of 2 parts of mono-ammonium phosphate to 1 part of potassium nitrate diluted at the rate of 8 lb. of the mixture to 50 gal. water. No significant differences were found between the control plants and those receiving the treatments, but an application of the solution, several days before transplanting, to the pots in which the plants were growing, brought about earlier flowering in snapdragon and delphinium. With *Taxus*, applications at intervals before transplanting increased survival, height and branching.—Cornell Univ.

838. SMITH, K. M.  
Some new virus diseases of ornamental plants.  
*J. roy. hort. Soc.*, 1950, 75: 350-3, illus.

(1) *Lily ringspot virus*. Hybrid lilies from the U.S.A. showed a faint mottling of the leaves which later disappeared. The plants were not stunted and appeared otherwise normal with normal flowers. Transmission of the virus to *L. tigrinum* and *L. regale* (by the green peach aphid) resulted in the rapid development of dead areas in the leaves which spread through the plant. The growing point was killed, no flowers were formed and the whole plant was stunted and deformed. The clue to the different behaviour of American and English lilies may be that the plants surviving the initial severe phase of the disease recover and show only symptoms of mild mosaic the following season, a hypothesis which is to be tested next year. (2) *White streak of tulips* becomes manifest in white stripes running parallel along the length of the leaf. The affected plant was abnormally small and stunted and the flower was also small and degenerate. Although there is no definite proof yet, it is likely that the disease is transmitted by a common species of aphid which is frequently found on tulips. A second new virus of tulip, which remains to be explored, is briefly mentioned. (3) *Tropaeolum ringspot* appeared in the

writer's garden first on broad bean and later on nasturtium some distance away, the symptoms being mottling of the leaves with necrotic spots and stunting of the whole plant. The virus has a wide host range and will affect a variety of ornamental plants, including petunia; it is transmitted by *Aphis fabae* and *Myzus persicae*. (4) In the year following the occurrence of the ringspot virus a mosaic appeared in nasturtium plants raised from seeds of the previous season's crop. The flowers of plants affected with *Tropaeolum* mosaic showed a distinctive colour break so that the second virus could be easily distinguished from the ringspot described above, apart from the difference in symptoms caused in the test plants. *Tropaeolum* mosaic is transmitted by *Myzus persicae*. Brief descriptions are also given of (5) a distortion of leaf blades in *Phlox paniculata* caused by a previously undescribed virus and (6) of a mosaic occurring in a *Buddleia* sp. The reactions of test plants are discussed in each case and most of the symptoms are illustrated photographically.—Plant Virus Research Unit, Moltano Inst., Cambridge.

839. BAKER, K. F.  
Bacterial fasciation disease of ornamental plants in California.  
*Plant Dis. Repr.*, 1950, 34: 121-6, bibl. 19.

The fasciation disease caused by *Corynebacterium fascians* occurs on numerous ornamental plants during most seasons in California. It is often a limiting factor in commercial culture of Esther Read daisy. The results of field observations and greenhouse and laboratory tests over several years are presented. The pathogen has a wide host range of 34 genera in 21 families of flowering plants.

840. DIMOCK, A. W.  
Semesan drench for rhizoctonia control.  
*Bull. N.Y. St. Flower Gr.*, 1950, No. 60, pp. 6-7.

Semesan, a mercury compound, is recommended for the control of damping-off of flower seedlings and cuttings caused by *Rhizoctonia solani*. Infected plants should be removed and an area about 2 ft. greater in diameter than the infected spot should be drenched with Semesan at the rate of 2 lb. per 100 gal., using  $\frac{1}{2}$  to 1 pint per sq. ft. Semesan should not be used on roses or on other plants in a greenhouse where roses are grown.—Cornell Univ.

841. SCOTT, N. J.

**Storage cellar construction in Canada.**

*Amer. Nurserym.*, 1950, 92: 8: 10, illus.

The construction of the storage cellars used on a nursery for ornamental plants in southern Ontario is described. Excellent storage conditions are obtained where two complete walls, made of cinder blocks, are used, with a 1-inch air space providing the insulation. All the door openings are double, and 3 rows of 200-watt bulbs spaced 15 feet apart provide an additional protection against frost. When the temperature approaches 32° F, the lights automatically switch on, and when 1° higher than 32° is reached, the lights cut off. Ventilation is provided by large electric exhaust fans. Rose bushes kept perfectly in a cellar with 18-in. thick, cinder block walls.

842. FISCHER, C. W., Jr.

**Ethylene gas a problem in cut flower storage.**

*Bull. N.Y. St. Flower Gr.*, 1950, No. 61, pp. 1, 4, bibl. 5.

Ethylene given off by flowers is the main cause of their aging in storage. Trials at Cornell indicate that reduced temperatures inhibit the evolution of ethylene. It has also been shown that lower temperatures retard mould growth considerably, and since moulds increase ethylene output in cut flowers the added benefit of low temperature control is apparent.

843. FISCHER, C. W., Jr.

**Long-term cut flower storage now possible.**

*Bull. N.Y. St. Flower Gr.*, 1950, No. 62, pp. 6-8, bibl. 1.

Roses, carnations, pompons, peonies, garden lilies, and lilies-of-the-valley stored in better condition at 31° F. than at higher temperatures during trials at Cornell. It is believed that low temperature storage will prove beneficial to most flowers with the exception of orchids. Storage in a moisture-proof pack was superior to the conventional storage of flowers with their stems in water.

**Annuals and herbaceous plants.**

(See also 48, 49, 72, 402, 682, 837, 839, 927a, b, j, o, q, r, s, t, u, x, 1195, 1201, 1207.)

844. SAITO, K.

**Studies on inducing polyploid flower plants and their utilization. I. On several polyploid plants of wallflower, stock and other flowers.** [Japanese, English summary ½ p.] *J. hort. Ass. Japan*, 1949, 18: 129-37, bibl. 41, illus.

In 1948 several polyploid plants were obtained by colchicine treatment. The following results are recorded: Wallflowers, tetraploid, flowers larger and deeper yellow, more fragrant, partially fertile; Stock, tetraploid, flowers larger and more fragrant, partially fertile; Stock, octaploid (possibly), flowers larger, petals thicker and variegated with pink and white, more fragrant, sterile; Verbena, tetraploid, flowers larger and scarlet; Verbena, pentaploid (possibly), flowers larger, leaves thicker and hairy, almost sterile; Verbena, hexaploid, flowers large, rich crimson to scarlet, leaves larger and deep green; Petunia, tetraploid, flowers larger and doubleness more pronounced.

845. CHEVALIER, C.

**La duplicature chez les fleurs. Double flowers.)**

*Rev. hort. Paris*, 1949, 121: 119-22, illus.

The author deals with the different types of morphological modification that may give rise to double flowers, and gives numerous examples. Although the causes of doubling are not known, his own experience with stocks is in line with the theory that old seed produces a higher proportion of double flowers than new seed.

846. GÉRARD, M.

**Remarques sur la duplicature de quelques espèces florales. (The doubling of flowers in certain species.)**

*Jardins Fr.*, 1949, 3: 256-60, 281-4.

Dealing with the production and propagation of double-flowered types in carnation, petunia, stock and zinnia.

847. FISCHER, C. W., Jr.

**Production of a toxic volatile by flowering stems of common snapdragon and calceolaria.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 447-54, bibl. 12, illus.

1. Snapdragons and calceolarias produced a toxic volatile, suspected to be ethylene. 2. The volatile manifested itself by causing the flower abscission of the material that produced it. There were no apparent foliar effects. 3. Conditions of high O<sub>2</sub> or low CO<sub>2</sub> increased flower drop observed, while high CO<sub>2</sub> content decreased flower drop. 4. In trials with snapdragon, activated charcoal had little effect in repressing flower drop. Brominated charcoal virtually stopped all flower drop. 5. Air accumulated from confined atmosphere snapdragon treatments induced the "triple response" on etiolated pea seedlings. Severity of pea response showed a correlation with amount of flower drop. [Author's summary.]—Cornell Univ.

848. RIBBANDS, C. R.

**The foraging method of individual honey-bees.**

Reprinted from *J. Anim. Ecol.*, 1949, 18: 47-66, bibl. 15.

The observations were made on a plot in the garden attached to the Bee Department at Rothamsted Experimental Station, sown with Shirley poppies (*Papaver rhoeas*), *Eschscholtzia* "Orange King", nasturtium "Tom Thumb", *Limnanthes douglasii* and *Nemophila insignis*.

849. LIN, L. C., AND WATSON, D. P.

**The influence of daylength and temperature on the growth and flowering of *Callistephus chinensis* Nees.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 441-6, bibl. 5, illus., being *J. Art. Mich. agric. Exp. Stat.* 1114.

Young aster plants were kept from 6 December to 31 March at 50° F. and 65° F., and with ordinary light and ordinary light plus 5 hours artificial light per day. At 65° F., long-day treatment hastened flower bud initiation and bud appearance by 15 days. At 50° F.



long-day treatment hastened flower bud initiation by 30 days and bud appearance by 25 days.

850. ANON.

**Calendula rust.**

*Agric. Gaz. N.S.W.*, 1950, 61: 294, illus.

This disease, caused by *Puccinia distincta*, affects calendula (leaves, petioles and peduncles), cineraria, and daisy (*Bellis perennis*). Recommendations for control are to destroy all self-sown seedlings, and to dust or spray with a sulphur preparation at the first sign of rust.

851. CHAN, A. P.

**The development of crown and terminal flower buds of *Chrysanthemum morifolium*.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 461-6, bibl. 19.

Studies, initiated at Columbus, Ohio, and completed at the Central Experimental Farm, Ottawa, are described, in which the anatomical development of two chrysanthemum varieties, Bittersweet and Orchid Queen, was compared under conditions of long and short photoperiods. The development of the inflorescence was found to take place in two fundamental phases, first the initiation of the capitulum, and secondly the initiation of the florets. The latter phase takes place much later in the ontogeny of the inflorescence than was formerly supposed. It is clear that the "crown" bud is not a distinct type of bud from the "terminal" bud, but is a similar bud in which development has been arrested before the florets are initiated. A "terminal" bud is merely a flower bud that completes differentiation without any arrest in its development. The effects of photoperiod and pinching on bud development are discussed.

852. POST, K.

**Controlled photoperiod and spray formation of chrysanthemums.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 467-72, bibl. 9, illus.

Four pompom chrysanthemum varieties were involved in trials at Cornell University in which plants receiving 1 to 12 short photoperiods followed by 5 to 20 long photoperiods and then again by short photoperiods were compared with plants receiving the normal treatment of continuous short photoperiod. The development of crown buds was induced by 3 to 5 short photoperiods followed by 5 or more long photoperiods. The length of the pedicels, following complete budding after 12 short photoperiods, was dependent on the length of the long photoperiod that followed. Two treatments produced sprays that were probably superior to those produced under continuous short photoperiod: (1) A terminal spray with crowned buds produced by giving 12 short and 10 long photoperiods, and (2) a crowned spray with terminal clusters resulting from 4 or 5 short and 15 or 20 long photoperiods.

853. POST, K., AND KAMEMOTO, H.

**Cutting removal and effectiveness of short photoperiod on chrysanthemums.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 473-4, bibl. 2.

Stock plants of Arcadia chrysanthemums all formed crown flower buds after four short photoperiods if

shoots remained on the plants. The buds developed on all cuttings removed 10 or more days after four short photoperiods. As the interval of long photoperiods was reduced before taking the cuttings, after the four short photoperiod treatment, less buds formed. The growth to the crown bud decreased with time after the treatment. [Authors' summary.]—Cornell Univ.

854. POST, K.

**Accumulation of photoperiodic stimuli in chrysanthemums.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 475-6, bibl. 2.

Starting 22 December, plants of a late chrysanthemum variety were given short photoperiods with long photoperiods intervening at different stages. After 25 January all plots received short photoperiods until they were in bloom. The results of the trial show (1) that 4 or more short photoperiods in succession were necessary to initiate crown buds, and (2) that 6 short photoperiods did not have a cumulative effect in forming crown buds, when as many as 6 long photoperiods were interspersed in the series and no more than 3 short photoperiods were applied in succession.—Cornell Univ.

855. POST, K., AND KAMEMOTO, H.

**A study on the number of short photoperiods required for flower bud initiation and the effect of interrupted treatment on flower spray formation in two commercial varieties of chrysanthemums.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 477-82, bibl. 3.

Three to four short days given 14 and 24 days after pinching were sufficient to initiate flower buds in the Gold Coast variety of chrysanthemum. With the Vibrant variety, although the response was irregular, 5 short days were sufficient to initiate crown flower buds. More than 6 short days resulted in the production of lateral buds; the number of buds produced increased with a corresponding increase in the number of short days. Various flower spray types were obtained with the different treatment on Gold Coast. Treatments that produced only crown buds (3 to 6 short days followed by long days) resulted in branched types of spray formations. Although 2 short days did not show any effect on bud initiation when the plants were examined 25 days after the start of the treatment, crown buds were produced at a very late stage which resulted in an open type of flower spray formation. [From authors' summary.]—Cornell Univ.

856. POST, K., AND KAMEMOTO, H.

**Photoperiod and bud formation on chrysanthemum cuttings.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 483-5, bibl. 2.

Some time during the period 15-29 days after cuttings of Arcadia chrysanthemum were made they began to respond to photoperiodic stimuli. When long photoperiods were given on or before the 29th day after cuttings were taken, the development of buds that had just been initiated was arrested and was not resumed with the restoration of short photoperiods. After the 29th day long photoperiods checked but did not stop bud development, and normal development was

resumed when short photoperiods were restored.—Cornell Univ.

857. OKADA, M.

**Studies on the crown bud of chrysanthemum.**

I. [Japanese.]

*J. hort. Ass. Japan*, 1949, **18**: 226-32, bibl.

10, illus.

Chrysanthemum plants were submitted to treatments of short days, long days and supplementary electric lighting from 1 August to 22 September (53 days). Results obtained were: (1) with 11 short days, 15 long days and 7 days electric light there were 100% crown buds, (2) 17 short days, 9 long days, 7 days electric light, 100%, (3) no short days, 26 long days, 27 days electric light, 75%, (4) no short days, 37 long days, 16 days electric light, no crown buds.

858. STUART, N. W.

**The effect of stunt disease on the growth and production of greenhouse chrysanthemums.**

*Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 458-60.

Data collected on 30 varieties of chrysanthemum grown under glass during the 1947-48 winter at the Plant Industry Station, Beltsville, Md, showed that plants infected with the stunt virus disease produced about half as many flowers per plant, were two-thirds as tall and weighed less than half as much as healthy plants. Marked differences were found between the varieties, and in some the disease affected flower colour adversely. The recommended practice of growing stunt plants unpinched was found to have no material effect on their growth. The provision of 1 and 3 hours of supplementary light at different times during the night and for various periods had very little effect on the time of blooming in most cases.

859. ANON.

**Chrysanthemum stunt mottle.**

*Gr. Digest*, 1949, **1**: 3: 37-40, illus.

A brief description is given of the symptoms of this virus disease, first reported from the U.S.A. and now causing concern in Canada. Few cases have occurred in Britain, and while they may not be so harmful here a warning against its spread is given with special reference to the variety Mayford Orange.

860. BRIERLEY, P.

**Some host plants of chrysanthemum stunt virus.**

Abstr. in *Phytopathology*, 1950, **40**: 869.

Manual inoculation of 30 Compositae, including 8 species of chrysanthemum and species of 21 other genera, has thus far revealed 3 additional plants that expressed symptoms, and 9 plants that developed no recognizable symptoms but from which the stunt virus was recovered in the florist's chrysanthemum Mary MacArthur. *Cineraria* (*Senecio cruentus*) promises to be useful as a test plant for this virus.

861. KELLER, J. R.

**New virus complex of chrysanthemums.**

*Bull. N.Y. St. Flower Gr.*, 1950, No. 62,

pp. 2-5, bibl. 4, illus.

1. The "measles" disease of the chrysanthemum variety Mistletoe is caused by the same virus that produces typical stunt in Vibrant, Sea Gull, and Blazing Gold. Different varieties may vary greatly

in response to infection by the same virus. 2. A new masked virus found in apparently healthy Blanche plants causes "crinkle" of Blanche when combined with the stunt virus. This new virus is tentatively called chrysanthemum virus Q. 3. Stunt in the varieties Sea Gull, Vibrant, and Mistletoe can be diagnosed by leaf symptoms in three to four weeks following inoculation by grafting and in three to four months following juice inoculation. 4. Over 90 plant species were tested, without success, in an effort to find a plant which would give a rapid and distinctive reaction to the chrysanthemum stunt virus. [Author's summary.]—Cornell Univ.

862. STAPLEY, J. H.

**Parathion kills chrysanthemum eelworm.**

*Grower*, 1950, **34**: 935.

Excellent control of chrysanthemum eelworm, *Aphelenchoides ritzemabosi*, was obtained in England by two sprayings, one at the rooted cutting stage and the other 1 month later, with Fosfermo 20 at 1 fl. oz. in 5 gal. water (=a concentration of 0.025% parathion).—Plant Protection Ltd. Res Stat., Fernhurst.

863. ANON.

**Leaf nematode of chrysanthemum controlled by E.605.**

*Agric. Gaz. N.S.W.*, 1950, **61**: 247-8, illus.

Trials indicate that the leaf nematode, as well as caterpillars and aphids, can be controlled by spraying at 3-weekly intervals from early February [late summer] until 3-4 weeks before harvest with 1 part 20% E.605 to 400 parts water. Stronger concentrations than 1:400 may cause some injury to the older leaves, particularly in showery weather.

864. HAHMANN, K., AND MÜLLER, H.

Weitere Erfahrungen mit der Chrysanthemen-Gallmücke. (Further observations on the chrysanthemum gall midge.)

*NachrBl. dtsch. PflSchDienst.*, Braunschweig, 1950, **2**: 129-31, bibl. 5, illus.

During the continued incidence of the chrysanthemum gall midge, *Diarthronomyia chrysanthemi*, in nurseries of the Hamburg area (see also *H.A.*, 19: 3304) the authors observed that in unheated glasshouses under favourable conditions of hibernation a midge generation may hatch in winter which attacks the later chrysanthemum cuttings and requires control. Three dust or spray applications of E605 were found to be necessary for a complete kill of all stages within the galls.—Staatsinst. f. angew. Botanik, Hamburg.

865. CAYEUX, H., AND CAYEUX, L.

Nouvelles digitales hybrides. (New digitalis hybrids.)

*Rev. hort. Paris*, 1950, **122**: 156, illus.

Two species of hybrids are described and illustrated: (1) *Digitalis ambigua* × *D. ferruginea* and (2) *D. lanata* × *D. ferruginea*.

866. NILSSON, A.

*Ligularia wilsoniana* Greenm. × *clivorum* Max. och denna hybrids förhållande till *L. hessei* Bergm. (*Ligularia wilsoniana* Greenm. × *clivorum* Max. and the relation of this hybrid to *L. hessei* Bergm.) [English and German summaries  $\frac{1}{2}$  p. each.]

*Agri hort. Genet.*, 1950, **8**: 33-42, bibl. 4, illus.



An attempt was made, by crossing *Ligularia wilsoniana* and *L. clivorum*, to produce the new hybrid variety *L. hessei* on a larger scale and more rapidly than was possible by vegetative propagation. Over half the hybrid plants obtained from this cross corresponded entirely or almost entirely with *L. hessei*, a fact that suggests that this variety was derived from such a cross. The hybrids were sterile, but a high percentage of them inherited the ability of *L. clivorum* to form adventitious buds on root cuttings. It is suggested that the name *hessei* ought not to be applied to types of this cross other than the original clone (*L. hessei* s. str.) or possibly to *hessei*-like  $F_1$  plants (*L. hessei* s. lat.).—Plant Breeding Institution, Weibullsholm, Landskrona.

867. STEARN, W. T.

*Nepeta mussinii* and *N. × Faassenii*.

*J. roy. hort. Soc.*, 1950, 75: 403-6, bibl. in text.

Under the name *Nepeta mussinii* two plants are widespread in gardens. One is the true *N. mussinii*, a species native to the Caucasus, but this is neither so popular nor horticulturally so valuable as its hybrid descendant *N. × Faassenii*, a plant of garden origin unknown in a wild state. The distinguishing features of the two plants are stated. [Author's summary.]

868. SCHWANITZ, F.

Untersuchungen an polyploiden Pflanzen.  
IX. Über den Gehalt der Blätter diploider und tetraploider Gartenstiefmütterchen (*Viola tricolor maxima hort.*) an Calcium-oxalatdrusen. (Studies on polyploid plants.  
IX. The calcium oxalate content in the leaves of diploid and tetraploid garden pansies (*V. tricolor maxima hort.*).)

*Züchter*, 1950, 20: 208-9, bibl. 13.

The leaves of tetraploid pansies were found to contain considerably less oxalate sediment per unit area than diploid leaves. The explanation offered is that tetraploids take up less nutrients owing to reduced transpiration and to a lower suction force of the roots.—Baden branch of the Kaiser-Wilhelm-Inst. f. Züchtungsforschung, Erwin Baur Inst.

869. SIVORI, E. M., AND WURCELDORF-WARDEN, J. E.

Un inhibidor en *Matthiola incana*. (A germination inhibitor in *Matthiola incana*.) [English abstract 5 lines.]

Reprinted from *De Lilloa*, 19: 49-70 as *Publ. téc. Inst. Bot. B. Aires* 42 (n.s.), 1949, pp. 22, illus.

The seeds of stocks, *Matthiola incana*, were found to have an inhibiting effect on the germination of seeds of some species, and a stimulating effect on others. The chemical reactions of the active solutions extracted from the seeds are recorded.

### Bulbs, tubers, etc.

(See also 27, 478, 751, 838, 927d, g, 1216, 1226.)

870. PAPE, H.

Pflanzenschutzmassnahmen im Blumen-zwiebelbau. (Plant protection in flower bulb growing.)

Reprinted from *Gartenwelt*, 1950, No. 15, pp. 2, illus.

An illustrated pamphlet dealing with the most widespread pests and diseases of tulips, narcissi, irises, hyacinths and gladioli. As regards control, great stress is laid on the removal and destruction of diseased bulbs, adequate spraying and correct treatment of bulbs in storage.

871. ANON.

Bulb viruses.

*Agric. Gaz. N.S.W.*, 1950, 61: 297-8, illus.

Most stocks of lilies, daffodils and bulbous iris in New South Wales are infected with virus diseases to some degree, but hyacinths and tulips are usually fairly free. Infected plants should be dug up and burned, and aphids should be controlled by periodic spraying.

872. INGELSTRÖM, E.

Blomsterlök, årgång 1949. (Flower bulbs, 1949.)

*Växtskyddsnotiser*, 1950, No. 1, pp. 15-16.

The following diseases occurred in Sweden in 1949.

(1) Tulips: *Rhizoctonia tuliparum*, *Botrytis tulipae*, breaking, necrotic virus, ring disease caused by *Ditylenchus dipsaci* and another eelworm species. (2) Hyacinths: a bacteriosis occurring always in combination with the mite *Rhizoglyphus echinopus*.

873. McCLELLAN, W. D., AND MARSHALL, B. H., Jr.

Effect of temperature on the development of some diseases of *Gladiolus*, *Narcissus*, and *Lilium*.

Abstr. in *Phytopathology*, 1950, 40: 872.

The optimum temperatures for the growth in culture of a number of parasitic fungi of these host plants are given.

874. ABBISS, H. W.

Bulb storage. The influence of temperatures on flower production.

*Fruitgrower*, 1950, No. 2856, p. 354.

A summary of some of the results obtained at the Gulval Experiment Station, Cornwall. Details of the work have been published in the station's annual reports and in the *R.H.S. Daffodil Year Books*.

875. PERRET, J.-E.

Essais sur deux insectes floricoles. (Experiments in the control of two flower-eating insects.)

*Rev. hort. Paris*, 1949, 121: 138-9, bibl. 1.

Several insecticides in the form of dusts were tested in Morocco for the control of the flower-eating beetles *Tropinota squalida* and *Hoplia aulica* on anemones. With the former, lead arsenate, calcium arsenate and 1% dinitrophenol gave no control; 10% DDT was very variable in its effect but showed a strong repellent action; 10% benzene hexachloride gave a complete kill. With the latter species, all the insecticides tested gave complete control. In tests with calendula, using naphthalene, paradichlorobenzene, sulphur, tetramethylthiuram bisulphide, talc and DDT, the last mentioned gave best protection with the least undesirable effects.

876. TOMPKINS, C. M., AND TUCKER, C. M.

Rhizome rot of white calla caused by *Phytophthora erythroseptica*.

*Phytopathology*, 1950, 40: 712-14, bibl. 1, illus.

The external symptoms of a rhizome rot of white calla

(*Zantedeschia aethiopica* Spreng.) caused by *Phytophthora erythroseptica* Pethyb. are small to large, irregular-shaped, dark brown, water-soaked lesions which later become dry and slightly sunken. Internally, infected tissues are firm but rubbery in texture, light grey, and odourless. In pot experiments the fungus failed to infect the foliage, roots and rhizomes of actively growing, healthy plants.—Univ. of California and of Missouri.

877. HOFFMANN, A.

Le thrips du glaieul (*Taeniothrips simplex* Morisson: *T. gladioli* Moulton et Steinweden). (*Gladiolus thrips*).  
*Jardins Fr.*, 1950, 4: 41-5, bibl. 17, illus.

*Gladiolus thrips* is a new pest in French floriculture. Its biology is described and control discussed under the headings: soil disinfection, bulb disinfection and treatment of the growing crop.

878. JOHNSON, B. L., AND GRIFFITHS, A., Jr.  
Effect of temperature and humidity on the longevity of *Hemerocallis* pollen as measured by its ability to effect capsule and seed set.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 507-12, bibl. 7.

Pollen stored at 3° C. and 10% relative humidity remained viable for at least 3 months, while pollen stored under conditions of uncontrolled temperature and humidity had lost its viability before the 8th day.—Univ. of Calif., Los Angeles.

879. NESTERENKO, P. A.

Vegetative segregation in the florentine iris and lavender. [Russian.]  
*Agrobiologija* (Agrobiology), 1949, No. 5, pp. 53-63.

Observations on colour changes in the flowers of the florentine iris (*Iris germanica* var. *florentina*) and lavender show that bud sports sometimes arise in these plants and that the colours are retained in vegetative propagation.

880. HAYASHI, K.

On the anthocyanin in the flowers of Japanese *Iris*. (Preliminary note.) [Japanese, English summary.]

*Bot. Mag. Tokyo*, 1940, 54: 23-9, from abstr. in *Jap. J. Bot.*, 1941, 11: (50) [received 1950].

The pigments occurring in the violet-red and the blue flowered varieties of Japanese iris (*Iris ensata* vars. Makino and Nemoto) have been isolated and studied. The pigments from the petals of these two varieties were found to be identical. The colouring matter is an anthocyanin which, on hydrolysis, yields glucose and a sugar-free pigment, which was identified as malvidin chloride, C<sub>17</sub>H<sub>12</sub>O<sub>7</sub>Cl.

881. KALIN, E. W., AND COURTNEY, W. D.

The effect of hot-water-formalin treatment on the forcing qualities of Wedgewood iris.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 455-7, bibl. 4, being *Sci. Pap. Wash. St. agric. Exp. Stats* 857.

The critical time for hot-water-formalin treatment of

iris bulbs is influenced more by the seasonal maturity of the bulb (particularly around 1 September) than by the lapse of time from digging to treating within reasonable limits. Delayed digging slightly reduced the quality of flowers produced. Hot-water-formalin treating of iris bulbs slightly reduced the percentage of flowers produced. [Authors' conclusions.]

882. STUART, N. W., AND GOULD, C. J.

Further studies of the effect of curing and storage temperatures on forcing of Wedgewood iris.

Reprinted from *Flor. Rev.*, 20 July, 1950, pp. 4.

Some practical results are reported of experiments made during the 1949-50 season by the Western Washington Experiment Station, Puyallup, and the U.S. Department of Agriculture at Beltsville. It was found that blooming of iris bulbs could be accelerated by as much as 4 weeks by an appropriate curing treatment. A short curing period (10 days) resulted in earlier blooming than longer curing periods, and an increase in curing temperature, from common storage up to 95° F., progressively accelerated blooming. The curing treatment was of most benefit to bulbs harvested at about normal maturity, and was most effective when applied immediately after harvesting. The use of supplemental light during forcing was ineffective in hastening blooming or improving flower quality. Increasing the number of bulbs planted per flat to more than 30 resulted in more blindness and reduced flower quality. Bulbs grown in sand without fertilizer produced mainly blind stems or blasted flowers. Bulbs stored at 50° F. in a saturated atmosphere rooted while in storage and bloomed slightly earlier than bulbs that were stored at a relative humidity of 80-85%. Delay of 1 or 2 weeks in planting iris after removal from cool storage delayed blooming and resulted in the production of many abnormal flowers. Fumigation of uncured bulbs with methyl bromide delayed blooming.

883. NAKAJIMA, Y.

The value of stored *Lilium* pollen for making crosses between *L. speciosum*, *L. auratum* and *L. makinoi* and of the resulting abnormal seeds. [Japanese, English summary.]

*Bot. Mag. Tokyo*, 1940, 54: 473-83, illus. and

Hybrids of *Lilium speciosum* and *L. auratum*, with supplementary notes on the preservation of pollen and the culture of abnormal seeds. [Japanese.]

*Pract. Hort.*, 1940, 26: 13-17, illus., both from abstr. in *Jap. J. Bot.*, 1941, 11: (105-6) [received 1950].

By using pollen preserved under cool, dry conditions with glycerine as a desiccating agent, the author was able to make crosses between several species of *Lilium* that flower at different seasons. The crosses between *L. speciosum* and *L. auratum* proved most interesting. The resulting seeds were almost all abnormal with a soft endosperm and were unable to germinate. By embryo culture, however, it was found possible to raise plants to maturity. The excised embryos were cultured in a nutrient medium (2-5% glucose, 5-10% cane sugar, or 5% fructose, to which a little mannite



or mannose was added). When the primary root appeared the plants were transferred to a sand culture and fed with Knop's solution. Finally they were transferred to pots and grown in the normal way.

884. WYATT, O. E. P.

**The hybridizing of lilies; an amateur's approach.**

*J. roy. hort. Soc.*, 1950, **75**: 378-86, illus.

The qualities expected of new strains of lilies are: beauty of colour and shape and lush foliage; hardy constitution; resistance to disease; scent; self-supporting stems; easy vegetative reproduction; and perhaps the capacity of breeding true from seed. In the light of his own experience the author gives hints to amateurs on how to achieve these aims.

885. TAMURA, T.

**Lily propagation by scales.** [Japanese.]

*J. hort. Ass. Japan*, 1949, **18**: 233-6.

Two series of experiments were carried out with lily bulb scales, from 28 August to 28 September (1) with 3 rates of moisture at 3 temperatures, (2) in light and in darkness at the same moisture rate. A temperature of 21° C. and medium moisture gave the best results as regards the number and development of bulbils and root growth. Medium and low temperatures gave better results with a medium than with a high rate of moisture. Scales exposed to light and darkness gave equal numbers of bulbils, but in darkness the bulbils were larger than those in light.

886. STUART, N. W.

**Forcing tests with the Georgia lily.**

*Flor. Exch.*, 1950, **115**: 15: 15.

In tests carried out by the Bureau of Plant Industry, Beltsville, Md, Georgia lily bulbs stored in moist peat as soon as they were mature and kept at a temperature of 45° F. for about 6 weeks flowered the earliest. For later flowering the bulbs should be kept sufficiently moist and at temperatures of 32° F. or slightly below.

887. MCCLELLAN, W. D., AND OTHERS.

**Mercury content of narcissus in relation to plant injury.**

Abstr. in *Phytopathology*, 1950, **40**: 872.

In trials with mercury preparations for the control of Fusarium basal rot of narcissus it was found that the mercury content was greatest in the centre, basal plates, and shoots, and least in the outer scales of the bulbs. Mercury content in the centre of these bulbs was: with centres decayed 300 p.p.m.; bulbs producing very little foliage 125 p.p.m.; bulbs producing yellow foliage 75 p.p.m. Spergon, Arasan, and Mersolite 8 caused no plant injury in any location.

888. MINISTRY OF AGRICULTURE, LONDON.

**Narcissus flies.**

*Adv. Leafl. N.A.A.S. Lond.* **183**, 1950, pp. 4, illus., 1d.

An account of the damage caused by the large narcissus fly, *Merodon equestris* F. and the two small bulb flies, *Eumerus strigatus* Fall. and *E. tuberculatus* Rond., with control measures by surface cultivation, hot water treatment and insecticides.

889. NEWTON, W., AND BOSHER, J. E.

**Package measles of tulips.**

*Sci. Agric.*, 1950, **30**: 402-4, bibl. 1, being *Contr. Div. Bot. Plant Path., Dep. Agric., Ottawa*, 1037.

Large losses were sustained by 2 greenhouse growers on Vancouver Island through "package measles" of tulip blooms, a disease characterized by an extensive spotting of the foliage and petals and which develops only after the bloom is cut and wrapped in wax paper for market. Moisture within the packages was found to be a contributing factor, but the primary cause was traced to the contamination of blooms prior to cutting with spores of a form of *Botrytis cinerea* that originated on plant debris beneath the benches in dull weather. Symptom development on the bloom in the packages was prevented by spraying the plants prior to cutting with a 0.5% solution of nabam (dithane). [From authors' summary.]

*Cacti and succulents.*

890. BRETT, D. W.

**An introduction to the structure of succulent plants.**

*Nat. Cactus Succ. J.*, 1949, **4**: 10-11, 36, 56, and 1950, **5**: 6-7, illus.

A simple, illustrated account is given of the morphology and anatomical structure of cacti and other succulents.

891. BYLES, R. S.

**Some notes on the genus *Sedum* Linn. (Crassulaceae).**

*Nat. Cactus Succ. J.*, 1950, **5**: 31-3, 49-50, bibl. 5, illus.

Following a brief general account of the genus and its distribution, notes are given on 20 of the more useful species.

*Orchids.*

892. HOLTUM, R. E.

**Horticulture in Singapore.**

*J. roy. hort. Soc.*, 1950, **75**: 363-6.

The article discusses flower, especially orchid, growing in Singapore and pays tribute to the skill of the Chinese gardener, from whose methods the preparation of potting soil from burnt earth and his technique of applying liquid manure are selected for brief descriptions. It is suggested that Chinese horticultural practice, which produces 10 vegetable crops in a year on the same plot, would repay scientific investigation.

893. ROTOR, G., Jr.

**A method of vegetative propagation of *Phalaenopsis* species and hybrids.\***

Abstr. in *Proc. Amer. Soc. hort. Sci.*, 1950, **55**: 434.

A vegetative method for propagating *Phalaenopsis amabilis* from flower stalks has been developed. The method consists of planting sections of the flower stalk in nutrient agar solution [for a popular account see *H.A.*, 20: 1825 and 1826].—Cornell Univ.

\* Published in full in *Amer. Orchid Soc. Bull.*, December, 1949.

894. NARAYANASWAMI, S.

The occurrence of a velamen and mycorrhiza in the subterranean roots of the orchid *Spiranthes australis* Lindl.

*Curr. Sci.*, 1950, 19: 250-1, bibl. 1, illus.

The occurrence of cortical mycorrhiza, a piliferous layer and velamen cells was observed in the roots of the terrestrial orchid *Spiranthes australis*. The fact that this material came from marshy ground throws doubt on the theory that such an arrangement is an adaptation to dry conditions.

*Roses.*

(See also 330, 840, 841, 1207, 1231, 1236.)

895. LEROY, A.

Composition des roseraies. (The lay-out of rose gardens.)

*Rev. hort. suisse*, 1950, 23: 310-15, illus.

Plans for the lay-out of rose gardens are discussed by a Paris superintendent of parks.

896. DAVIDSON, O. W., AND ASEN, S.

The boron requirement of greenhouse roses.

*Bull. Roses Inc.*, 1950, No. 146, pp. 3-4, from abstr. in *Bull. N.Y. St. Flower Gr.*, 1950, No. 54, pp. 6-7.

The surface soil used by flower growers is likely to have a low B content because of years of leaching and crop removal. In sand or gravel culture the optimum concentration of B in the solution was found to be 0.25 p.p.m., though deficiency and toxicity symptoms do not appear until levels of 0.05 and 1.0 p.p.m. respectively have been reached. Leaf analysis proved to be a more accurate test than soil analysis, a B content of 20 p.p.m. in the topmost 5-leaflet leaf (when the bud is just showing colour) indicating adequate supply. The adoption of one of the following measures is recommended to forestall B deficiency: the application of 2-4 lb. borax per ton of fertilizer, the use of fertilizers with a high B content, or the application of mulches with a high B content.

897. WRIGHT, J. A., AND VOLZ, E. C.

Effects of four methods of irrigation on the production of greenhouse roses.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 486-8, bibl. 4, being *J. Pap. Ia agric. Exp. Stat.* J.1678.

Constant-level sub-irrigation gave a higher production of total saleable blossoms for a 1-year period and a longer average stem length than the three other methods tested, viz. injection sub-irrigation, the Ohio State special nozzle system, and surface watering.

898. SEELEY, J. G.

Constant water level subirrigation and surface watering of greenhouse roses in three soil types.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 489-92, bibl. 8.

The stem length was good in all treatments with little difference between treatments. The amount of water required for the constant water level method was only one-third to one-half as great as for surface watering. More fertilizer was required to maintain the optimum

nutrient level in surface watered soils than in the soils watered from below by a constant water level. [From author's summary.]—Cornell Univ.

899. SEELEY, J. G., AND POST, K.

Constant water level, automatic injection, and surface watering of roses.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 493-8, bibl. 8.

1. There was no significant difference in rose production with surface watering and automatic injection watering at the same capillary tension. With the constant water level method, the rose production was five to nine flowers per plant lower than with surface and injection watering. 2. Stem length was good in all treatments with little difference between treatments. 3. Mulched plots were not significantly higher in flower production, but had a smaller water and fertilizer requirement than unmulched plots. 4. The water and fertilizer requirements of automatically watered plots was considerably less than for surface watered plots. [Authors' conclusions.]—Cornell Univ.

900. SHANKS, J. B., AND LAURIE, A.

Rose root studies: the optimum oxygen concentration of the soil atmosphere.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 499-503, bibl. 6.

Better Times rose plants were grown in soil aerated with gas mixtures containing oxygen concentrations that ranged from 1 to 29%. The best growth of the tops was obtained from plants growing in concentrations of 9, 13 and 17%.—Ohio agric. Exp. Stat.

901. JUNE, R. I.

Pruning bush, standard, and climber roses.

*N.Z. J. Agric.*, 1950, 80: 443-5, illus.

Notes are given on reasons for pruning, hard or light pruning, pruning tools, making the cuts, after-pruning care, pruning new plants, shaping bush and standard roses (weeping standards, bush and standard polyantha roses, climbing roses), rose species, and time of pruning.

902. IGNATJEV, B. D.

A carotinoid concentrate obtained from the fruits of wild rose. [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1950, 70: 69-70, bibl. 7.

It was found that the carotinoid content of the fruits of *Rosa acicularis* increased with development up to the stage of technical maturity, and corresponded with a similar increase in the accumulation of ascorbic acid.

*Shrubs and trees.*

(See also 837, 927c, e, h, m, n, v, w, y; 1216, 1222, 1227, 1236.)

903. PILET, P.-E., AND MICHEL, H.

Application des hormones et substances de croissance dans le bouturage. (The use of hormones and growth substances in propagation.)

*Rev. hort. suisse*, 1950, 23: 307-10, bibl. 19, illus.

In addition to giving a brief survey of the problem the authors summarize their own results obtained with



stem cuttings of *Thuja occidentalis* and with leaf cuttings of *Ramonda myconi*.—Lausanne University.

904. PALINSKY, J., Sr.

**Oxide for damping-off.**

*Amer. Nurserym.*, 1950, 92: 4: 44-5.

A nurseryman reports his success in controlling damping-off of seedlings with red copper oxide. The solution, diluted to a "deep pink" colour [quantities not specified], was poured over wet burlap spread on top of the seeded flats or was watered on to the pricked out seedlings. Good results were obtained with conifers, rhododendrons, vegetables and tomatoes.

905. VAN DINTHER, J. B. M.

Morphologie en biologie van de schildluis *Chionaspis salicis* L. (The morphology and biology of the scale insect *Chionaspis salicis* L.) [English summary 5 pp.]

*Tijdschr. PlZiekt.*, 1950, 56: 173-252, bibl. 117, illus.

An account of the willow scale insect. The list of host plants given includes a number of woodland trees and shrubs, and also a few of horticultural interest, e.g. *Jasminum* spp., *Syringa vulgaris* (lilac), *Paeonia* sp., *Pirus* spp., *Ribes* spp. Its classification and synonymy, morphology, biology, natural enemies and control, by cutting off infested branches and applying 4% mineral oil as a dormant spray, are described in detail.

906. CHADWICK, L. C., TILFORD, P. E., AND IRISH, C. F.

**A study of some methods of fertilizing shade trees.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 519-26, bibl. 6.

In a trial in Ohio the greatest increase in the growth of young *Acer platanoides* trees resulted from a mulch of stable manure plus a surface application of a 10-6-4 fertilizer. The drilled-hole, crowbar and other methods of applying the fertilizer to the root zone proved inferior to surface applications.

907. DICKEY, R. D., AND WILMOT, R. J.

**Testing of native and introduced shrubs and ornamentals and methods for their propagation.**

*A.R. Fla agric. Exp. Stat. for 1948/49*, p. 88.

Combining a fungicidal dip of Spergon plus a root-inducing chemical increased the percentage rooting in some varieties of azalea. With tulip bulbs stored for 25, 50 and 75 days at 45° F. the average number of days from planting to emergence and flowering became less, and the proportion that flowered and the average height of the plants became larger as the cold storage period was increased. There was, however, some difference as between two seasons. Storage for 4 days in ethylene chlorhydrin gas inhibited growth in tulip bulbs.

908. CHEVALIER, C.

Les bougainvilliers. (Bougainvilleas.)

*Rev. hort. Paris*, 1949, 121: 149-50, bibl. 6, illus.

Descriptions of the principal horticultural species, varieties and hybrids, with notes on culture.

909. TARJAN, A. C.

**A consideration of mineral nutrition of boxwood in relation to infection by meadow nematodes, *Pratylenchus* spp.**

*J. Wash. Acad. Sci.*, 1950, 40: 157-61, bibl. 17.

Mineral analyses for boron, calcium, magnesium, nitrogen, phosphorus, potassium, and sodium were conducted using stems, leaves, and roots of healthy and meadow nematode-infected dwarf English boxwoods, *Buxus sempervirens* var. *suffruticosa*. It was found that roots of infected plants contained higher levels of sodium and of nitrogen whereas the roots of healthy plants contained a higher level of potassium. Leaves of infected plants contained a higher level of phosphorus, while leaves of healthy plants contained a higher level of potassium. [Author's summary.]

910. INGRAM, C.

**A simple method for propagating camellias.**

*J. roy hort. Soc.*, 1950, 75: 397-8.

The author suggests a method by which leaf cuttings of camellias may be rooted rapidly and with the minimum of labour. A layer of charcoal is placed at the bottom of a large-mouthed sweet jar which is then more than half filled with a mixture of finely chopped sphagnum moss and coarse silver sand, and a few more pieces of charcoal scattered on top. The whole contents are then moistened, the camellia leaf-cuttings inserted and the stopper of the jar replaced. One side of the upper unfilled portion of the jar is shaded, and the jar placed on a sunny bench in an unheated greenhouse. Some cuttings of the hybrid camellia *Donation*, taken in June and treated in this way, were ready for potting by the fifth week.

911. HARVEY, J. M., AND HANSEN, H. N.

**Camellia flower blight and its control.**

*Abstr. in Phytopathology*, 1950, 40: 965-6.

In this disease, caused by *Sclerotinia camelliae*, the two chief control measures are sanitation, and the suppression of apothecia. Apothecia from sclerotia have been suppressed by applications of Fermate to the soil.

912. HADFIELD, M.

**Cuttings of deciduous conifers.**

*J. roy hort. Soc.*, 1950, 75: 487.

A brief note on the propagation of *Gingko biloba* by dormant woody cuttings.

913. MILANO, V. A.

Las especies del genero "*Ligustrum*" cultivadas en la Argentina. (Species of *Ligustrum* cultivated in the Argentine.)

*Rev. Invest. agric. B. Aires*, 1949, 3: 353-80, bibl. 39.

Botanical descriptions and general observations on each species are presented, with an identification key and excellent illustrations.

914. (SAX, K.)

**Rootstocks for lilacs.**

*Amer. Nurserym.*, 1950, 92: 4: 36-7.

An extract from a paper by K. Sax, published in *Arnoldia*, 14 July, 1950. Two recently developed methods of propagation are described which would

avoid the disadvantages of the common methods of propagation by cuttings or by grafting onto privet or lilac rootstocks. (1) The Kerr method of grafting should permit the use of privet and other rootstocks with much less danger of the persistence of the nurse root. The piece root is grafted upside down, so that the root-promoting hormone accumulates at the graft union, stimulating rooting of the scion and suppressing growth of the nurse root. This method has been used in the Arnold Arboretum in the propagation of Arnold Giant forsythia, a variety which does not root easily from cuttings. (2) The use of the tree lilac, *Syringa amurensis japonica*, as a rootstock or nurse root for the common lilac would avoid all danger of graft blight, which occurs with the privet rootstock. Moreover, it does not sucker, as do the commonly used lilac rootstocks. Tree lilac seedlings have been budded and grafted with various *vulgaris* varieties, with *vilosa* hybrids and with hybrids between *vulgaris* and *laciniata*. All have made good growth. The white-flowered varieties of common lilac, however, have shown some evidence of incompatibility when budded on tree lilac. Common lilac flowers in the third to the fifth year after grafting, and makes a sturdy tree-like growth. A limited amount of seed of the tree lilac is available from the Arnold Arboretum, Jamaica Plain, Mass.

## 915. ANON.

**Oyster-shell scale on woody shrubs.**

*Amer. Nurseryman*, 1950, 92: 4: 24-5.

It is reported from the New York Agricultural Experiment Station, Geneva, that strains of the oyster-shell scale found on woody shrubs, such as willow and lilac, are more difficult to kill than the species which occur on apple. Tests with the dinitro compound Elgetol, used at the rate of 1 gal. per 100 gal. water, have given encouraging results. The material should only be used when the plants are in a strictly dormant condition. Heavily infested wood should be cut out and burnt. Two sprays of Black-Leaf 40, at the rate of 1 pint to 100 gal. water, and applied with a 5-day interval, will kill the insects as they hatch out in May or June.

## 916. DIMITRI, M. J.

Las magnoliaceas de los generos *Liriodendron*, *Magnolia* y *Michelia* cultivadas en la Argentina. (The magnoliaceae (genera *Liriodendron*, *Magnolia* and *Michelia*) cultivated in the Argentine.)

*Rev. Invest. agric. B. Aires*, 1949, 3: 381-95, bibl. 10, illus.

Well illustrated botanical descriptions, with notes on ornamental value, propagation, etc.

## 917. MILLINGTON, W. F., AND GUNCKEL, J. E.

**Structure and development of the vegetative shoot tip of *Liriodendron tulipifera* L.\***  
*Amer. J. Bot.*, 1950, 37: 326-35, bibl. 24, illus.

The growth habit and the changes which accompany the annual cycle of growth in *Liriodendron* are described and related to the development of the shoot apex and its derivatives. [From authors' summary.]

\* An abstract of this paper appeared in *Amer. J. Bot.*, 1949, 36: 800, and was noted in *H.A.*, 20: 1879h.

## 918. SMIRNOW, L.

**Tree peonies.**

*Brooklyn bot. Gdn Rec.*, 1950, 6: 97-100, illus.

Though the tree peonies originate from ancient China, the present 3 groups distinguished are: the European, the Japanese from the same ancestry (*Paeonia suffruticosa*), and the lutea hybrids, *Paeonia lutea* × *P. suffruticosa*. Propagation is done by grafting, division or layering, cleft grafting on roots of the herbaceous peony being the safest and quickest method. Variety lists are given.

## 919. PARKER, M. W., BORTHWICK, H. A., AND RAPPEYE, L. E.

**Photoperiodic responses of poinsettia.**

*Flor. Exch.*, 1950, 115: 20: 11, 49-50, bibl. 6.

Photoperiods of 8 or 9 hours were about equally effective in inducing flowering of poinsettia (*Euphorbia pulcherrima*), variety Oak Leaf, 11 hours slightly delayed it, and 13 hours inhibited it. When poinsettias are grown under conditions of natural photoperiod considerable variability in their rate of development is encountered from one year to another. Growers attempt to reduce this variability by temperature regulation. Much more uniform results might be obtained if the plants were kept vegetative until the latter part of September by the use of additional light and were then abruptly transferred to photoperiods of 8-9 hours daily for a few weeks.

## 920. DONEY, C. F.

**An unusual hedge plant.**

*Brooklyn bot. Gdn Rec.*, 1950, 6: 114-15, illus.

Trifoliolate orange, *Poncirus trifoliata*, is fairly healthy in Brooklyn Botanic Gardens and is injured only in severe winters. In a milder climate with its stiff interlacing, spiny branches, it makes a splendid clipped hedge plant.

## 921. KNOTT, J. E.

**The use of maleic hydrazide for controlling the growth of a pyracantha hedge.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 504-6, bibl. 1, illus.

The necessity for frequent clipping of a *Pyracantha crenulata* hedge was greatly reduced by spraying the hedge, after clipping, with a solution containing 0.5% of maleic hydrazide, applied at a rate which moistened well the tops of the clipped stems. This required about 15 to 30 ml. per square foot. New shoot growth was completely checked for at least a month and greatly retarded for several months after that. No injury to the evergreen foliage or to any partly developed berries was apparent. [Author's summary.] —Univ. of Calif., Davis.

## 922. CREECH, J. L.

**Air-layering a rhododendron hybrid.**

*Nat. hort. Mag.*, 1950, 29: 114-17, illus.

At the U.S. Plant Introduction Garden, Glenn Dale, Maryland, 18 air-layers (marcots) were made in early May, 1949, with the previous year's wood of the variety America. Eleven had rooted in August and were potted. The method used was to slit the stem as for



mound-layering, applying a small quantity of indolebutyric acid, 8 mg./g. of talc, into the wound with a knife blade. Moist sphagnum was squeezed dry, wrapped round the stem, the whole being enclosed in an 8 in. x 10 in. sheet of polythene plastic [see also *H.A.*, 20: 3091].

923. OZOL, A. M.

Producing bush forms of *Schizandra chinensis* by cultural methods. [Russian.]  
*Agrobiologija* (Agrobiology), 1950, No. 1, pp. 150-3.

*Schizandra chinensis* is an ornamental shrub and a source of essential oils; its berries contain citric and malic acids and are used in confectionery. Its ecology is described. It is naturally a liane of the far east forests, growing under conditions of shade in light soil rich in humus. Trials have shown that when grown in open ground it tends to grow as a bush, particularly in clayey soil. Around Moscow it is resistant to cold. In very severe winters young seedlings may be injured, but then only on the unripened wood of the upper branches.

924. GILLE, A.

Le *Spiraea tomentosa* L. dans la région de Granby (Comté de Shefford, Québec, Canada): Étude écologique et phytosociologique. (*Spiraea tomentosa* in the region of Granby, County Shefford, Quebec, Canada: A study of its ecology and plant associations.) [English summary 16 lines.]  
*Vegetatio*, 1950, 2: 166-96, bibl. 34, map.

The first part of this study is devoted to the geographical distribution of *Spiraea tomentosa* L. (including var. *rosea*) in North America. In the second part, which deals with the ecology of the species, such factors as light and soil (texture, pH, water content) are considered. The third part is a study of plant associations in the vicinity of Granby.

925. TOMPKINS, C. M., AND HANSEN, H. N.

Flower blight of *Stephanotis floribunda*, caused by *Botrytis elliptica*, and its control.  
*Phytopathology*, 1950, 40: 780-1, bibl. 2.

In the nursery where this disease was observed more than 2,000 clusters of flowers were rendered unsaleable. Towards the end of the flowering season that year (1945) the ventilators were closed and higher air temperatures restored. This inhibited the development of the disease on the last crop of flowers and proved to be an efficient means of control.—Univ. of Calif.

### Lawns.

(See also 927i.)

926. HUME, E. P., AND FREYRE, R. H.

Propagation trials with *Manila* grass, *Zoysia matrella*, in Puerto Rico.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 517-18, bibl. 2.

Trials with *Manila* grass and three other grasses (*Axonopus compressus*, *Polytrias praemorsa* and *Eremochloa ophiuroides*) used for lawns in the tropics have shown that satisfactory establishment is only possible in the absence of competition from other vigorous lawn grasses or weeds.

### Noted.

927.

a BAKER, K. F., AND MACLEAN, N. A.  
Powdery mildew of snapdragon on the Pacific Coast.

*Plant Dis. Repr.*, 1950, 34: 183-5, bibl. 17.

b BEAUMONT, A.

Diseases of China asters.

*Gdnrs' Chron.*, 1950, 128: 140-1.

c BEAUMONT, A.

Diseases of shrub veronicas.

*Gdnrs' Chron.*, 1950, 128: 128, illus.

d BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.

*Gladiolus thrips* [*Taeniothrips simplex*].

*Pict. Sheet U.S. Dep. Agric.* 6, revised 1950, pp. 2, illus.

e CHENAULT, M.

Les arbustes décoratifs nouveaux ou peu connus. (Some new or little-known flowering shrubs [in French gardens].)

*Jardins Fr.*, 1950, 4: 153-61, illus.

f CHEVALIER, M.

La culture florale aux États-Unis. (Flower growing in the United States.)

*Jardins Fr.*, 1949, 3: 178-86, 218-22, 239-44, illus.

g CONSTABLE, W. A.

Some lesser-known lilies.

*North. Gdnr.*, 1950, 4: 33-6, and 94-7, illus.

h CREUZBURG, U., AND WENZL, H.

Botrytisschäden an Goldribes (*Ribes aureum*) in Österreich. (*Botrytis* damage to *Ribes aureum* in Austria.) [English summary 7 lines.]

*PflSch. Ber. Wien*, 1950, 4: 97-8, bibl. 5.

i CUENOT, G.

Le *Zoysia matrella* (L.) Merr., son emploi pour la confection des pelouses au Maroc. (*Zoysia matrella* for lawns in Morocco.)  
*Rev. hort. Paris*, 1950, 122: 184, bibl. 3, illus.

j ERNST, A.

Resultate aus Kreuzungen zwischen der tetraploiden, monomorphen *Primula japonica* und diploiden, mono- und dimorphen Arten der Sektion *Candelabra*. (Results from crossings between the tetraploid, monomorphic *Primula japonica* and diploid, mono- and dimorphic species of the section *Candelabra*.)

*Arch. Klaus Stift.*, 1950, 25: 135-236, bibl. 43, illus.

k FISCHER, C. W., Jr.

Present methods of flower storage are obsolete.

*Bull. N.Y. St. Flower Gr.*, 1950, No. 59, pp. 5, 8.

l FRANDSEN, N. O. C.

*Septoria helianthi* Ell. et Kell. als Erreger einer Blattfleckkrankheit auf Sonnenblumen. (*Septoria helianthi*, a cause of leaf spot of sunflower.)

*Phytopath. Z.*, 1949, 15: 88-91, bibl. 9, illus.

- m HUNZIKER, J. H.  
Dos binomios confusos en el genero *Ephedra*: *E. tweediana* y *E. triandra*. (Confused nomenclature of *Ephedra tweediana* and *E. triandra*.)  
Reprinted from *Bol. Soc. argent. Bot.* 2: 278-86, as *Publ. téc. Inst. Bot. Buenos Aires* 32 (n.s.), 1949, bibl. in text, illus.
- n HUNZIKER, J. H.  
Sinopsis de las especies argentinas del genero "*Ephedra*". (Synopsis of Argentinian species of *Ephedra*.) [English abstract  $\frac{1}{2}$  p.]  
Reprinted from *De Lilloa*, 17: 147-74, as *Publ. téc. Inst. Bot. Buenos Aires* 34 (n.s.), 1949, bibl. 43.
- o JENSEN, D. D.  
*Nasturtium* mosaic, a virus disease of *Tropaeolum majus* L. in California.  
Abstr. in *Phytopathology*, 1950, 40: 967.
- p MAHESHWARI, P., AND NARAYANASWAMI, S.  
Parthenogenetic development of the egg in *Spiranthes australis* Lindl.  
*Curr. Sci.*, 1950, 19: 249-50, bibl. 4.
- q RASMUSSEN, A. O.  
Some interesting perennials for the home grounds.  
*Circ. Pa agric. Ext. Serv.* 370, 1950, pp. 16, illus.
- r STIRLING, W. F.  
Perennial scabious prefers lime.  
*Grower*, 1950, 34: 835, 837.
- s TASUGI, H., AND SIINO, H.  
Damping-off of seedlings of Chinese aster and zinnia. [Japanese, English summary.] *Ann. phytopath. Soc. Japan*, 1940, 10: 279-93, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (121-2) [received 1950].  
Deals with the symptoms and culture of two new forms of *Pythium*.
- t TAYLOR, G. M.  
Show auriculas; the edged varieties of the florists.  
*J. roy. hort. Soc.*, 1950, 75: 386-90, illus.
- u WATARI, S.  
Anatomical studies on the leaves of some saxifragaceous plants, with special reference to the vascular system.  
*J. Fac. Sci., imp. Univ. Tokyo*, Sec. III, 1939, 5: 195-316, illus., from abstr. in *Jap. J. Bot.*, 1941, 11: (125) [received 1950].
- v WATSON, A. J.  
Fungi associated with camellia flowers.  
*Plant Dis. Repr.*, 1950, 34: 186-7.
- w WILLIAMS, R. O.  
The white bougainvillea.  
*J. roy. hort. Soc.*, 1950, 75: 485-6.
- x WILSON, J.  
Violas.  
*J. roy. hort. Soc.*, 1950, 75: 396-7, illus.
- y YASHIRODA, K.  
Dwarfed potted trees or Bonsai; their culture and use in Japan.  
*Brooklyn bot. Gdn Rec.*, 1950, 6: 68-79, illus.

## SUB-TROPICAL FRUIT AND PLANTATION CROPS.

### General.

928. ANDERSSON, F. G., AND MARLOTH, R. H.  
Subtropical and tropical fruits.  
*Commun. afr. reg. sci. Conf.*, Johannesburg, B(h)7, 1949, pp. 4.

An account is given of the organization of research in South Africa on sub-tropical and tropical fruits, and the main studies in progress, particularly on citrus, are indicated. Lines for future research are suggested and the need for better co-ordination throughout all African territories is stressed.

929. MORGAN, C. N.  
Horticultural districts of Queensland. 4. Metropolitan.

*Qd agric. J.*, 1950, 71: 14-25, illus.

An account is given of the climate and soils of the districts within a 25-mile radius of Brisbane. The crops grown in the area include bananas, pineapples, strawberries, pawpaws, passion fruit (now limited by diseases), custard apples, figs, grapes, avocados, citrus, tomatoes and many other vegetables.

### Avocados.

(See also 1194, 1222.)

930. HODGSON, R. W.  
The avocado—a gift from the Middle Americas.  
*Econ. Bot.*, 1950, 4: 253-93, bibl. 22, illus.

A comprehensive account is given of the avocado—its origin and spread, botany, cultural requirements, pest and disease control and its economic aspects in the United States and in other countries.

931. GUYOT, H.  
Multiplication de l'avocatier. (Avocado propagation.)  
*Fruits d'Outre Mer*, 1950, 5: 173-80, illus.

The raising of seedlings, various grafting and budding techniques and propagation by marcots and cuttings are described with the aid of photographs, and the results of a trial tabulated.—Station Regionale des Antilles, I.F.A.C.

932. CONOVER, R. A., AND RUEHLE, G. D.  
A study of diseases of avocado and mango and development of control measures.  
*A.R. Fla agric. Exp. Stat. for 1948/49*, p. 253.

A one-minute dip in 2-amino-pyridine (5%) appeared the most promising of the treatments tested to control stem-end rot (*Diplodia natalensis*) and anthracnose (*Colletotrichum gloeosporioides*) in avocado fruits; borax dips accelerated stem-end rot. On young Haden mango trees spraying with bioquin-1 (copper-8-quinolinolate) proved as effective as bordeaux mixture against mango anthracnose and did not leave a visible residue on the fruit at harvest time.



933. WOLFENBARGER, D. O.

**Red mite control on avocados and mangos.***J. econ. Ent.*, 1950, 43: 377-80.

Sulphur in whatever form used in a series of tests was very effective in control of the avocado red mite, *Paratetranychus yothersi*, on avocado and mango trees. Oil emulsion sprays were also very effective in mite control. Other materials tried were parathion, dinitro-o-cyclohexyl phenol, azobenzene, di (p-chlorophenoxy) methane, tetraethyl pyrophosphate, a proprietary selenium compound, combination of sulphur and a dust sticker, micronized sulphur, and dinitro capryl crotonate, all of which proved relatively ineffective. [Author's summary.]—Sub-tropical Exp. Stat., Homestead, Fla.

934. MARIÑO MORENO, E.

El *Copturomimus perseae* Hustache, nueva especie entomológica, grave plaga del aguacate en Colombia. (*C. perseae*, a new and serious insect pest of avocado in Colombia.)

*Rev. Fac. nac. Agron. Colombia*, 1947, 7: 26: 167-247, bibl. 14, illus., from abstr. in *Rev. appl. Ent.*, 1950, 38: 312-13.

Observations on the bionomics of the weevil are described. The only method of controlling the larvae is to remove affected twigs and branches. The adults are very susceptible to a DDT suspension applied to the branches, and this might give effective control if applied 2-3 times at monthly intervals during the dry season. [For a French translation of this article see *H.A.*, 19: 3340.]

**Citrus.**

(See also 126, 920, 928, 1004, 1011a, b, c, d, f, 1194, 1222, 1234.)

935. PUBOLS, B. H.

**Citrus fruit during world war II.**

*Agric. Monogr. U.S. Dep. Agric., Bur. agric. Econ.*, 3, 1950, pp. 77, bibl. 11.

The production, distribution, demand and prices of citrus and citrus products in the U.S.A. are discussed in detail, with the aid of tables, for the war period and the periods immediately preceding and following it. The war reversed a tendency for supply to exceed demand, and this trend has now once again been reversed. To-day citrus fruits constitute two-fifths or more of total domestic fruit production, and the crop in 1945-46 reached approximately  $7\frac{1}{2}$  million tons. Attempts are now being made to find new outlets and uses for both fresh and processed citrus fruits.

936. AMIZET, L.

Les agrumes en Californie. (*Citrus growing in California.*)

*Fruits et Prim.*, 1950, 20: 155-76, bibl. 3, illus.

A survey of the Californian citrus industry under the following heads: Citrus regions; varieties; rootstocks; special features of the Californian citrus industry; scientific research; and conclusions.

937. ZORIN, F. M.

Raising citrus hybrid seedlings. [Russian.] *Agrobiologija* (Agrobiology), 1950, No. 1, pp. 56-67, illus.

Work on citrus breeding at the Soçi research station is described with particular reference to raising frost resistant forms for the sub-tropical regions of U.S.S.R. *Poncirus trifoliata*, which can survive 20° [C.] of frost, is considered to be a suitable parent for hybridization trials. The use of frost-resistant mentors is mentioned.

938. RICHARDS, A. V.

**A new tropical citrus variety.**

*Calif. Citrogr.*, 1950, 35: 530-1, reprinted from *Trop. Agriculturist*, April-May, 1949.

A description is given of the chance discovery of an almost seedless sweet orange at Bibile in Ceylon. This orange is now known as the seedless Bibile sweet orange and it is thought that it may be a nucellar seedling variant. It has been budded on to several rootstocks. It matures 1-2 months later than the ordinary Bibile sweet orange and appears to have other good qualities besides its near seedlessness. C.W.S.H.

939. BATCHELOR, L. D., AND CAMERON, J. W.

**Nucellar seedling strains of citrus.**

*Calif. Citrogr.*, 1950, 35: 454-5, 470-1, illus.

Seedlings arising from the nucellus of citrus seeds often show great vigour and increased thorniness. Thorniness can be reduced in the following budded generation by selecting budwood from thornless parts of the shoot. In some cases nucellar strains have been found to have poor characteristics such as core hollowness and pulp granulation and drying, but in individual cases improved vigour, and sometimes fewer seeds, are not accompanied by undesirable characteristics. An outstanding example is the Frost Eureka lemon nucellar strain which shows greater vigour and greater resistance to "shell bark" and "dry bark" on the trunks than the parent Eureka strain. It is suggested that in orchards where replanting with old strains has proved difficult vigorous nucellar strains might be tried. There is also evidence that a change over to nucellar strains will prevent the transmission of certain virus diseases from the parent tree. Some nucellar strains have also given larger fruit than the parent clone. C.W.S.H.

940. NAUDÉ, C. J., AND MALAN, E. F.

**Propagation of citrus.**

*Fmg S. Afr.*, 1950, 25: 277-80, 301, bibl. 2, illus.

Practical directions for raising rootstocks from seed, care of seedlings in the nursery, selection of budwood, budding, care of the budlings, and lifting the trees.

941. DE OLIVEIRA E CASTRO, F. R.

Propagação vegetativa da laranjeira azêda. (*Vegetative propagation of the sour orange.*)

*Rev. agron. Lisboa*, 1947, 35: 189-225, bibl. 23, illus. [received 1950].

A review of the literature is followed by an account of experiments in the vegetative propagation of sour orange by lignified, semi-lignified, soft wood, leaf and root cuttings and by grafting. The treatment of cuttings included wounding and hormone application. Histological observations were made on the experimental material.

942. MARSH, G. L., AND CAMERON, S. H.

**A rootstock-Navel bitterness relationship.**

*Calif. Citrogr.*, 1950, 35: 458, 477-9

It was noted that Washington Navel oranges grown in France and Australia did not give the bitter juice characteristic of this variety in California. It was suggested that this might be due to the different rootstocks used. Juice samples were tested for bitterness from Washington Navel oranges on sour orange, sweet orange, rough lemon, grapefruit, trifoliolate and Washington Navel rootstocks. Subjective tests for bitterness were made over two seasons. More bitterness developed in the second season, but big differences were found between the rootstocks in both seasons. It is probable that the non-bitter precursor is present in the early stages of fruit development when Washington Navel is grown on any rootstock, but that growth on some rootstocks causes it to disappear more rapidly than growth on others. The tests showed that grapefruit rootstocks caused the earliest disappearance of the non-bitter precursor, followed in order by the trifoliolate, sweet orange, sour orange and Washington Navel, and lastly rough lemon, on which it never disappeared completely. As far as flavour and aroma were concerned, the trifoliolate rootstock produced the best juice. C.W.S.H.

943. DU CHARME, E. P.

Resistencia del portainjerto *Poncirus trifoliata* a la infestación del nematodo en la Argentina. (Nematode-resistance of the rootstock *Poncirus trifoliata* in the Argentine.)

*Idia*, 1949, 2: 22: 18-19.

The results of an investigation made at the Citrus Experiment Station, Concordia, to determine whether tristeza disease of citrus was connected with eelworm infestation, showed that sour orange was no more susceptible to attacks of citrus eelworm (*Tylenchulus semipenetrans*) than most of the other rootstocks tested. *Poncirus trifoliata*, however, was found to be comparatively resistant, and no female cysts were found on the roots. The work is being continued to determine whether the hybrids of *P. trifoliata* show the same resistance.

944. NAIK, K. C.

Rootstocks for acid lime (*Citrus aurantifolia* (Christm.) Swingle).

*Indian J. agric. Sci.*, 1948, 18: 137-46, bibl. 12 [received 1950].

An experiment, with trees planted in 1938 and coming into bearing in 1941-42, is described in which limes were budded on to *C. limon*, *C. pennivesiculata* and *C. aurantifolia* respectively and also planted as unworked seedlings. The budded trees were superior to the seedlings in growth, early bearing and yield. *C. pennivesiculata* stocks produced the highest and *C. limon* the lowest yield of the budded plants. There were indications, however, that *C. pennivesiculata* will not maintain its superiority over the other two stocks and the stock stems have become markedly overgrown. The lime stock itself, which produces a smooth bud union, may eventually prove the best rootstock. The seedling trees had an erect habit and covered much less ground than the budded trees. The trial indicated that much wider spacing than that generally used is desirable. The optimum is considered to be about 25 feet. C.W.S.H.

945. LAPIN, V. K.

The influence of the diploid rootstock on the size and development of the tetraploid pear-shaped shaddock (*Citrus grandis* Osb.). [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 61: 1107-8, bibl. 3 [received 1950].

Grafting the roots of the diploid *Poncirus trifoliata* with the above-ground parts of the tetraploid pear-shaped shaddock produces a tree that is more vigorous and precocious than the tetraploid shaddock on its own roots; in this respect the grafted plants are comparable with the self-rooted diploid shaddock.

946. MIRIMANJAN, V. A.

A comparative study of the physiology of the diploid and tetraploid pear-shaped shaddocks (*Citrus grandis* Osb.). [Russian.]

*Doklady Akad. Nauk S.S.S.R.*, 1948, 60: 1581-3, bibl. 7 [received 1950].

Increasing the chromosome number in the pear-shaped shaddock so modifies the activities of the protoplasm that the hydration of the cell colloids is increased, the accumulation of ascorbic acid is decreased, and the hydrolytic processes are augmented.

947. HODGSON, R. W., AND WRIGHT, A. H.

On the comparative resistance of citrus to low winter temperatures.

*Calif. Citrogr.*, 1950, 35: 502, 534, 536-9, bibl. 3.

Observations at Los Angeles during the exceptionally cold periods in the winter of 1947-48 and 1948-49 showed that temperature inversion, i.e. lower temperatures near the ground than higher up, was an important factor in the 1947-48 winter but was almost absent in 1948-49. As a result, in 1947-48, tropical and sub-tropical fruits were injured up to a 9-12 ft. level only, an avocado nursery was totally destroyed and low-growing specimens of fairly cold-resistant plants were damaged. In 1948-49 the plants which had been injured only to 9-12 ft. in the previous year were injured to their full height, although temperatures only fell to 24° F. Damage was more severe to citrus trees on exposed sides of blocks, and to those which had recently borne a heavy crop or were lacking in vigour, and to trees on rough lemon rootstocks. Regarding the individual citrus species, the citron was more resistant than the West Indian lime, which in turn was harder than the Perrine lemon (lemonine); the grapefruit was harder than the shaddock; the rough lemon was harder than the true lemons; Rangpur and Kusaie limes were very frost resistant; Tahiti limes were more resistant than West Indian limes; lemons as a whole were less resistant than oranges, grapefruit and shaddocks; mandarins were more resistant than sweet oranges; sweet oranges were more resistant than grapefruit. Detailed varietal differences are given. C.W.S.H.

948. RYALL, A. L., AND JOHNSON, H. B.

Some effects of the freeze of January 1949 on Texas citrus fruits.

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 247-53, bibl. 4, illus.

A total of 42 to 44 hours below 32° F. with periods in the low twenties at the end of January caused severe



damage to citrus in the lower Rio Grande Valley. Studies on tree and fruit damage in 3 varieties of grapefruit and in Valencia oranges indicated that in general the severity of fruit injury was related to the severity of tree injury. Fruit in all orchards examined deteriorated with the passage of time, the rate of deterioration being related to the severity of tree damage. Marked differences in injury were found in adjacent orchards; where trees were growing vigorously damage was very severe, whereas where they were semi-dormant the injury was slight and their fruit was marketable.

949. DACKO, I. G.

**Lemons overwintered successfully.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 7, p. 44.

Young lemon trees survived the 1949/50 winter in the Crimea in trenches 90 cm. to 1 m. deep, covered with wooden planks and mats. The lowest temperature in the trenches was 0° C. Provision of deeper trenches is considered uneconomical, as only 0.5° C. higher temperature was recorded in a trench 1.5 m. deep.

950. KONOPLEV, N. A.

**Citrus fruits on the collective farms of Tashkent district.** [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 7, pp. 40-2.

Among young lemon trees, 81.6% of varieties New Georgian and Meier on trifoliate rootstock, planted in 1949, survived the winter. Because of the sharp continental climate of the region (temperatures up to 40° C. in summer to -20° to -30° C. in the winter), the trees were planted in trenches 1.8-2 m. deep, 2.5-2.7 m. wide and 50 m. long. The trenches run from east to west, and are provided with a protective covering of frames and mats.

951. BRICHET, J.

**La protection des arbres contre les violences solaires. (The protection of trees against sun burn.)**

*Fruits et Prim.*, 1950, 20: 204-6, illus.

In North Africa the trunks and branches of citrus and olive trees must be protected against sun burn (1) by keeping the stem low (50-60 cm. in the case of orange), thus encouraging shade from the branches, and (2) by applying a coat of whitewash about 1 May for which the following composition is recommended: 25 kg. slaked lime, 2 kg. commercial powdered zinc sulphate, 0.3 kg. of a commercial sticker and 400 or 200 l. water for application by spray or brush respectively. At the hottest time of the day the temperature in the centre of the trunk of a tree protected in this way was found to be 15° C. lower than that of an adjacent unprotected tree. If applied to trees recently headed back, the zinc sulphate constituent also stimulates the development of new foliage.

952. YOUNG, T. W., AND FORSEE, W. T.

**Fertilizer experiments with citrus on Davie mucky fine sand.**

*Bull. Fla agric. Exp. Stat.* 461, 1949, pp. 40, bibl. 21, illus. [received 1950].

The Davie soils consist of a peat overlying a grey sand which in turn overlies marl or soft porous limestone;

the water table is held by means of canals at an average depth of approximately 3 feet. The soils are inherently high in N and low in P and K. An experiment involving 16 combinations of N, P and K was laid out in 1934 in a 5-year-old Lue Gim Gong orange grove, in which the dark organic surface layer was 12-16 in. deep with pH 4.8-5.5, but was well supplied with Ca and Mg. Yields, fruit drop records and fruit sizes are recorded up to 1945. Differences in yield were insignificant for all treatments except for those involving no P and also the highest rate of P (12% P<sub>2</sub>O<sub>5</sub>). N showed no beneficial effect and may even have been detrimental to grades and sizes; contrary to what would normally have been expected, however, high N treatment was not necessarily found to be associated with ammoniation, i.e. an excessive N:Cu ratio. Application of P proved to be essential to satisfactory production over a prolonged period; with no P the dropping of mature fruits was severe; P also reduced the percentage of culls, produced fruit with thinner, smoother skins and lower citric acid; and the % total P in the leaves increased slightly while soluble P in the juice increased markedly. The highest rate of P, 12% P<sub>2</sub>O<sub>5</sub>, supplied as superphosphate, however, reduced yields and increased the number of culls in two treatments due to ammoniation which is a symptom of Cu deficiency; analyses showed that while Cu was not lower in the soil in these plots it was reduced in the foliage and in the fruit juice and seed. In 1944 a nutritional spray including Cu practically eliminated ammoniation from the 1945 crop. No significant differences resulted from the use of K at different rates; contrary to belief among growers, muriate of potash produced no ill effects. These responses are discussed in the light of results obtained elsewhere.

953. PEECH, M., AND YOUNG, T. W.

**Chemical studies on soils from Florida citrus groves.**

*Bull. Fla agric. Exp. Stat.* 448, 1948, pp. 88, bibl. 65 [received 1950].

The results of a soil survey in 1937 were published in Bulletin 340. A second survey was made during 1942-46 by the junior author who has now revised the original paper to include this new material. Chemical analyses presented in detail include the determination of exchange capacity; per cent. base saturation; exchangeable Ca, Mg, K, Mn, Zn, and Cu; acid (0.002 NH<sub>4</sub>SO<sub>4</sub>)-soluble P; total N; nitrate N; organic matter and pH. The analyses are discussed in the light of prevailing fertilizer practices.

954. PARKER, E. R., AND JONES, W. W.

**Orange fruit sizes in relation to potassium fertilization in a long-term experiment in California.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 101-13, bibl. 23, being *Pap. Calif. Citrus Exp. Stat.* 619.

A preliminary report on the effects of K on the size of Washington Navel oranges budded on sweet orange stocks at Riverside, California, has been described in *H.A.*, 20: 3133. This paper presents certain additional information. Coefficients of simple correlation between fruit size and yields and between fruit sizes and concentrations of N, P, K and Ca in the leaves from trees

receiving 30 different treatments in this experiment were large and significant in each case; but such correlations were considered to be of little value in assigning a causal relationship to any factor, and the concentrations of the various elements in the leaves were found to be interdependent. The application of partial regression statistics, however, indicated that the concentration of K in the leaves was the primary factor associated with variations in the size of fruits from trees manured in different ways. No important interactions were found between elements as affecting fruit size. Relations between fruit size and leaf K were found to be curvilinear, and in the most recent 4-year period of the experiment little increase in size occurred when the K content in the dry matter of spring-cycle leaves harvested in December was greater than about 1.3% of their dry weight. In this period, 57% of the total variation in fruit size was accounted for by variation in the K content of the leaves.

955. WILLSON, A. E.  
**Citrus nutrition studies : physiological studies.**

*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 272-5, illus.

Analyses of Mg in young grapefruit leaves in the spring showed no relationship between their Mg content and the presence or absence of Mg deficiency symptoms in old leaves. In boron spraying experiments on grapefruit, absorption of B was less for acid plots than for basic plots; more B was found in leaves which had a relatively high Ca content. The amount of B in succeeding flushes following spraying declined rapidly, indicating that the effect of the sprays was only temporary regardless of the amount of B absorbed. In studies on the boron-arsenic relationship in grapefruit, it became clear that two types of gumming in the fruit (illustrated photographically) should be recognized; one probably due to arsenic injury and the other through causes not associated with treatments.

956. SITES, J. W.  
**Citrus nutrition studies : fruit quality studies.**

*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 275-80.

Two experiments are reported. The first has been in progress for 9 years and involves comparisons of inorganic and organic fertilizer mixtures on 4 grapefruit varieties. The second, planted in 1944, compares the effects of 3 different sources of nitrogen on Hamlin oranges. Data are tabulated for external and internal quality and yields of the orange and two grapefruit varieties. Effects on yield have been more pronounced than effects on quality, but differences so far have been generally slight.

957. REITZ, H. J.  
**Citrus nutrition studies: arsenic studies.**  
*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 280-4.

Arsenic sprays are used to advance the date of legal maturity in grapefruit. Tests tended to confirm the belief that the use of copper sprays preceding the arsenic sprays reduces the effectiveness of the latter.

Combining wettable sulphur, lime-sulphur or oil emulsion with lead arsenate resulted in differences in the deposits of arsenic, but did not produce significant differences in fruit maturity or quality. The application of low rates of lead arsenate (0.3 lb. or less per 100 gal.) in May or June did not produce early autumn maturity but ensured in nearly all cases that fruit reached the legal minimum maturity ratio not later than January. Comparison of single and double applications of arsenic showed the former to be preferable.

958. WANDER, I. W.  
**The effect of calcium phosphate accumulation in sandy soil on the retention of magnesium and manganese and the resultant effect on the growth and production of grapefruit.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 81-91, bibl. 17.

On sandy soils of central Florida the use of superphosphate in mixed fertilizers and constant additions of ground limestone to maintain the soil reaction at pH 5.5 to 6.0 results in large accumulations of calcium phosphate. These in turn promote the retention of Mg and Mn added as sulphates but do not appreciably affect the retention of K. Growth and yield records indicate that conditions favouring the accumulation of calcium phosphate within the pH range of 5.5 to 6.0 result in better nutrition of grapefruit on these soils than conditions which do not favour such accumulation.

959. JONES, W. W., AND PARKER, E. R.  
**Seasonal variations in mineral composition of orange leaves as influenced by fertilizer practices.**

*Proc. Amer. Soc. hort. Sci.*, 1950, 55: 92-100, bibl. 17, being *Pap. Calif. Citrus Exp. Stat.* 620.

A study has been made of seasonal variations in the dry-weight composition (N, K, P, Ca and Mg) of leaves of Washington Navel orange trees on sweet orange roots in a long-term fertilizer experiment at Riverside, California, as well as of the influence of P and K fertilizers on the concentrations of these elements in the leaves. There was a decline in the N, P and K content of the leaves with age. Ca increased rapidly for the first 4 to 5 months, after which there was little change. Mg reached a peak after 5 to 6 months and then dropped to a low level in old leaves. The application of treble-superphosphate slightly increased the P content of the leaves, and the application of potash fertilizers markedly increased the K content of the leaves. The application of treble-superphosphate also increased the Ca and Mg content and decreased the K content of the leaves. The ratio, in chemical equivalents, of Ca plus Mg to K per unit of dry weight of the leaves was markedly modified by fertilizer practices and increased steadily as the leaves aged. The relations of the concentration of these elements to the interpretation of the results of the present experiment are discussed, particularly in regard to relations between leaf K and the size of the fruit [see also abstract 954 and *H.A.*, 20: 3233]. Emphasis is placed upon the fact that changes in composition as the leaves of orange trees age should be taken into account in the interpretation of the significance of foliar analyses. [From authors' summary.]



960. SMITH, P. F., AND REUTHER, W.  
Seasonal changes in Valencia orange trees.  
I. Changes in leaf dry weight, ash, and  
macro-nutrient elements.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55:  
61-72, bibl. 18.

Leaves were taken at frequent intervals from 4 non-fruited terminal growth flushes on young, healthy Valencia orange trees growing on rough lemon stock in Florida. Changes in dry weight, ash, N, P, K, Mg and Ca are shown graphically. As the leaf expanded to mature size the dry weight and all the constituents measured (as mg. per leaf) increased rapidly. Thereafter dry weight increased or decreased to some extent, depending on the growth activity of the tree and other factors; some constituents continued to accumulate slowly, others remained constant and others began to migrate out of the leaf. Each of the constituents expressed as a percentage of dry matter showed characteristic trends in relation to age of leaf and tree growth factors. As the curves for most of the elements measured levelled off when the leaves were 3 to 6 months old this would appear to be the best time to secure representative samples.

961. SITES, J. W., AND REITZ, H. J.  
The variation in individual Valencia oranges  
from different locations of the tree as a guide  
to sampling methods and spot-picking for  
quality. Part II. Titratable acid and the  
soluble solids/titratable acid ratio of the  
juice.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55:  
73-80, bibl. 1.

In an earlier paper [H.A., 20: 1935] data were presented on the soluble solids content of the juice of fruit from a single Valencia orange tree growing on rough lemon stock at the Florida Citrus Experiment Station. The present paper presents further data on the same fruit. Wide variations in titratable acid content were found between individual fruits, but these differences were not apparently related to the position of the fruit on the tree, although the acid content did vary to some extent with direction of exposure to light, and fruit on the north-east side of the tree was lower in acid for all classes of light studied. The soluble solids/titratable acid ratio of the juice also varied greatly between individual fruits, and was related to the position of the fruit on the tree. This was due mainly to variations in the soluble solids content as affected by amount of shading, height of the fruit on the tree and the direction of exposure to light.

962. SPURLING, M. B.  
Water requirements of citrus. I. Citrus  
root distribution.  
*J. Dep. Agric. S. Aust.*, 1950, 53: 536-41,  
illus.

Methods and results of citrus root distribution examinations over a wide range of soil types in South Australia are discussed under the following headings: (1) Characteristics of citrus roots; (2) Methods of examining citrus root distribution; (3) The influence of stock; (4) General characteristics of citrus root distribution; (5) The effect of soil type; (6) The effect of cultivation on citrus root distribution; (7) Irrigation and fertilizer

practices affecting citrus root distribution; (8) Water application required when irrigating citrus.

963. AHMAD, S., AND KHAN, M.-u.-D.  
Fruit bud differentiation studies in sour  
lime (*Citrus aurantifolia*) in the Punjab.  
*Punjab Fruit J.*, 1950, 14: 16.

Examination of 540 buds in longitudinal section showed more blossom bud differentiation in early than in late flushes. Terminal buds differentiated more readily than lateral ones. It is suggested, therefore, that all cultural operations should be performed well ahead of the start of growth in spring. C.W.S.H.

964. STEWART, W. S., AND HIELD, H. Z.  
Effects of 2,4-dichlorophenoxyacetic acid and  
2,4,5-trichlorophenoxyacetic acid on fruit  
drop, fruit production, and leaf drop of  
lemon trees.  
*Proc. Amer. Soc. hort. Sci.*, 1950, 55:  
163-71, bibl. 9, being *Pap. Calif. Citrus  
Exp. Stat.* 621.

Water sprays of 2,4-D and 2,4,5-T were applied to lemon trees in 8 plots in southern California over a period of 3 seasons. Both chemicals at 5 p.p.m., but particularly 2,4,5-T, significantly reduced the drop of mature fruit and of mature leaves. Both induced curling and distortion of young, expanding leaves, but did not reduce fruit yield or quality. Neither significantly reduced the drop of immature young fruit. In one plot significant yield increases, ascribed to an increase in fruit size, were obtained about 7 months after spraying with 8 p.p.m. 2,4,5-T as the butyl ester and with 8 p.p.m. 2,4-D as the triethanolamine salt but not with 8 p.p.m. 2,4-D as the isopropyl ester.

965. HOLODNYI, N. G., AND KOČERŽENKO, I. E.  
Regulating the growth processes of the  
lemon tree with growth substances. [Rus-  
sian.]  
*Doklady Akad. Nauk S.S.S.R.*, 1948, 61:  
391-4, illus. [received 1950].

Spraying lemon trees with  $\alpha$ -naphthaleneacetic acid (0.1%) in early autumn produced an increased yield the following year.

966. ALI, N.  
Pruning of sweet orange (Malta) trees in  
the Punjab.  
*Punjab Fruit J.*, 1950, 14: 7-10, bibl. 4.

Pruning young trees for good shape should be restricted mainly to removal of water-sprouts. No branching should be allowed under 2-2½ ft., above that 2-4 strong limbs being selected. During the first few bearing years pruning is confined to the removal of dead wood and suckers, the latter being removed 2 or 3 times a year. Later, when the trees show a general decline in productivity and health, they require correct pruning to assist in rejuvenating them. The method recommended in this case is "skeletonizing", in which the main framework is left but all cross limbs and undesirable shoots are removed. "Deheading" and "dehorning" are not advised. Young trees should be pruned in late winter or early spring; bearing trees after fruit has been harvested; decadent trees in late winter or early spring or in late summer. Cuts more

than a half-inch in diameter should be treated with melted paraffin wax or bordeaux paste. C.W.S.H.

967. ANON.

**Progress report on "a major operation".**

*Calif. Citrogr.*, 1950, 35: 503, illus.

In an orchard of 80-year-old seedling oranges the trees were sawn off and grafts inserted around the stumps [see *H.A.*, 20: 1906]. After 2 years these grafted trees were taller than 7-8-year-old replanted trees nearby. Growth has been so rapid that the scions need support. C.W.S.H.

968. HAAS, A. R. C.

**Acorn disease in grapefruit.**

*Calif. Citrogr.*, 1950, 35: 457, bibl. 6, illus.

"Acorn" disease is common on Washington Navel oranges. The cause is still unknown. Recently the disease was found in a Californian grapefruit orchard planted 15 years ago. A malformation of grapefruit known as "pink nose" occurs in Arizona, accompanied by an abnormal branching condition called "crazy top". These symptoms were not found accompanying the "acorn" disease symptoms in California. C.W.S.H.

969. MOREIRA, S., COSTA, A. S., AND GRANT, T. J.

**Conhecimentos atuais sobre a "tristeza" dos citros. (Our present knowledge of "tristeza" of citrus.)**

*Rev. Agric. Piracicaba*, 1949, 24: 335-45, Spanish translation in *Bol. Estac. exp. citricola Concordia* 2, 1949, pp. 9.

The findings of a commission set up in 1942 at São Paulo, Brazil, to investigate the nature of tristeza disease of citrus and the reactions of various rootstocks to the disease are reported. The possibility of transmitting the virus by grafting and by *Aphis citricidus* Kirk has been confirmed; several other insects have been tested as carriers with negative results. It has been found that symptoms appear on combinations with many rootstocks other than sour orange, i.e. grapefruit, citron, shaddock, kumquat and some lemons, and also on some species grown on their own roots. Some varieties of grapefruit and lime, moreover, exhibit symptoms even when grafted on to resistant rootstocks. The reaction to inoculation with the virus of over 300 species and varieties of citrus, used as stocks and scions and grown on their own roots, was investigated at Campinas. The behaviour of the resistant varieties as rootstocks is also being studied. The more important results are summarized here. The possibility of breeding a strain of sour orange resistant to tristeza is discussed. The factors responsible for resistance appear to be mainly dominant characters. Types recommended for crossing with sour orange in order to introduce resistance are sweet orange, mandarin, tangerine, trifoliata, and hybrids of trifoliata and Rangpur lime.

970. COSTA, A. S., GRANT, T. J., AND MOREIRA, S.

**Investigações sobre a tristeza dos Citrus. II. Conceitos e dados sobre a reação das plantas cítricas à tristeza. (Tristeza investigations. II. Theories and data on the reaction of citrus plants to tristeza.)** [English summary 1½ p.]

*Bragantia*, 1949, 9: 59-80, bibl. 13, illus.

Previous theories on the reaction of plants to tristeza are reviewed, and some results of investigations carried out at the Instituto Agrônomo, Campinas, are presented. Tests using viruliferous citrus aphids for inoculation of various citrus types budded on to sour orange rootstocks showed a correlation between susceptibility to infection and severity of symptoms. Sweet orange proved to be the most susceptible. No virus could be recovered from inoculated plants of *Poncirus trifoliata*, citrumelos (*P. trifoliata* × *C. paradisi*) and resistant citranges. It was found that sour oranges could be more easily infected by tissue union than by the aphid vector. The nature of injury caused by tristeza in non-tolerant graft and intermediate graft combinations is discussed. The symptoms shown by plants consisting of a sour orange intermediate stem-piece between sweet orange roots and foliage seem to indicate that phloem collapse of the stem-piece does not entirely prevent food translocation. Observations have shown that although root tissues of non-tolerant stocks may be sensitive to injury, the root symptoms are mostly secondary reactions. The fact that the virus was recovered from insect-protected shoots growing from severed roots of Caipara sweet orange indicates that the virus was definitely present in the roots of a tolerant rootstock. Fifty seedling types of citrus, including sweet orange, are reported to have shown tristeza symptoms following heavy inoculation, but types possessing tolerant tissue showed a tendency to recover. The mode of inheritance of the main characteristics of plant reaction to tristeza, and the reaction of infective buds on different stocks are discussed. The results of an experiment to determine the relationship of the virus to host tissues showed that the virus was not able to move across a ringed portion of the stem, and was therefore probably a phloem virus. Buds taken from sweet orange plants that have been infected for a long time have all been found to carry the virus, yet in tests with young, recently infected plants of Duncan grapefruit, sour orange and in some cases Dancy tangerine and Valencia sweet orange, it was found that not all the buds were carrying the virus. The reason for this is not known.

971. COSTA, A. S., GRANT, T. J., AND MOREIRA, S.

**A possible relationship between tristeza and stem-pitting disease of grapefruit in Africa.**

*Calif. Citrogr.*, 1950, 35: 504, 526-8, bibl. 5, illus.

Tristeza disease in Brazil shows the same symptoms as stem-pitting disease on grapefruit and limes in South Africa. The insect vector, *Aphis citricidus*, is the same in both diseases. It is not thought that there is more than one tristeza virus strain in Brazil. It is believed that tristeza was introduced into South America from South Africa. C.W.S.H.

972. McCLEAN, A. P. D.

**Virus infections of citrus in South Africa.**

I. Scaly bark or psorosis of citrus. II. Tristeza disease of Brazil.

*Fmg S. Afr.*, 1950, 25: 261-2, bibl. 5.

A brief note is given on the history and present position of these diseases in South Africa. Scaly bark, though widespread, is of minor importance, and has been effectively checked by the inspection and registration of trees used by nurserymen for propagation. Tristeza



disease, or a condition corresponding closely to it, has been reproduced in South Africa by budding and through the agency of *Aphis citricidus*.

973. McCLEAN, A. P. D.

**Virus infections of citrus in South Africa.**

**III. Stem-pitting disease of grape fruit.**

*Fmg S. Afr.*, 1950, 25: 289-96, bibl. 9, illus.

Proof of the virus origin of the stem-pitting disease of grapefruit comes from the Department of Agriculture, Pretoria, where the disease has repeatedly been transmitted by grafting and by means of the virus carrier, *Aphis citricidus*, to healthy grapefruit seedlings and to seedlings of other citrus species, including the West Indian lime, sweet lime Tamsen, citron and rough lemon. The West Indian lime has proved a particularly sensitive species and is being used as an indicator plant in the investigations. There is some evidence that stem-pitting of grapefruit is caused by the same virus as the disease of seedling limes reported from West Africa and xyloporosis, first reported from Palestine [see also *H.A.*, 20: 1922]. The author does not consider that the virus has any relation to psorosis, as was suggested by Oberholzer [see *H.A.*, 19: 3369]. It was found that the virus is not confined to grapefruit but is widespread, perhaps universal, in all the commercially grown citrus in South Africa. The rough lemon and most varieties of sweet orange, however, when grown on stocks of either rough lemon or sweet orange, showed a high degree of tolerance. There is evidence that at least 2 forms of virus are associated with the stem-pitting disease, one severe and the other mild. These forms have certain symptoms in common, but their exact relationship has not yet been determined. Whether infection by the milder one will afford protection against the severe one still requires investigation. Although the disease has not seriously affected the sweet orange industry, owing to the tolerance of the varieties and rootstocks used, there is a tendency for orchards of 25 years old or more to decline prematurely, which suggests that the virus may ultimately have an adverse effect even on tolerant species by shortening their productive life. The possible relationship of the virus to that causing tristeza disease, the influence of rootstock on infection, and the danger of the disease to the citrus industry in South Africa are discussed.

974. ANON.

**Stunt bush, or stem pitting—a potentially serious disease of Marsh grapefruit.**

*Agric. Gaz. N.S.W.*, 1950, 61: 365-6, bibl. 3, illus.

A disorder of grapefruit, similar to a virus disease described as stem pitting in South Africa, is found in Queensland, and also in New South Wales where it has been known for over 10 years as stunt bush. The symptoms are most pronounced on Marsh and Thompson grapefruit. Affected trees are much stunted and have a bushy appearance, and the foliage ultimately becomes somewhat sparse. The leaves are smaller than normal and may be slightly rounded and show more or less interveinal chlorosis. Such trees crop reasonably well, but most of the fruit is small, misshapen, very thick in the rind, develops little or no juice and colours prematurely. The wood of the trunk and larger branches is pitted with longitudinal depressions of varying size. Among other varieties some

show severe or mild stem pitting, while others top-worked on infected trees grow vigorously and show no symptoms.

975. MARCHIONATTO, J. B.

**Identificación de la lepra explosiva del naranjo con la leprosis de los citrus. (The identification of "lepra explosiva" of oranges with citrus leprosis.)**

*Cien. y Invest.*, 1950, 6: 331-2, bibl. 9, illus.

A brief review of the literature on the identity and causal agent of the disease known as "lepra explosiva" in the Argentine and that known as scaly bark in Florida. Recent observations [see *H.A.*, 20: 1022] have led to the conclusion that the two diseases are identical and the adoption of the name leprosis has been suggested.

976. MARTIN, J. P.

**Fungus flora of some California soils in relation to slow decline of citrus trees.**

*Proc. Soil Sci. Soc. Amer.* 1947, 1948, 12: 209-14, bibl. 23, illus., being *Pap. Calif. Citrus Exp. Stat.* 577 [omitted in error from *H.A.*, 19].

A study has been made to determine the qualitative nature of the fungus flora of old citrus soils of southern California, and to ascertain whether or not the growth of the citrus plant exerts a selective action on the nature of this population. Several species of *Penicillium*, *Aspergillus*, *Trichoderma*, and, occasionally, of other genera constituted the bulk of the mold population of non-citrus soils. The greater part of the fungus flora of the old citrus soils, on the other hand, consisted of *Fusarium* spp. 1 and 2, *Fungus* D1, *Pyrenochaeta* sp., and various species of *Penicillium*. *Fungus* D1 and *Pyrenochaeta* sp. were not found in non-citrus soil but were isolated consistently in relatively large numbers from all old citrus soils. *Fusarium* spp. 1 and 2 were found in both old citrus and non-citrus soils but in much greater concentration in old citrus soils. *Fusarium* sp. 1 was isolated repeatedly from apparently healthy, surface-sterilized citrus feeder roots. [Author's summary.]

977. MARTIN, J. P.

**Effect of soil fungi on germination of sweet orange seeds and development of the young seedlings.**

*Proc. Soil Sci. Soc. Amer.* 1949, 1950, 14: 184-8, bibl. 14, illus., being *Pap. Calif. Citrus Exp. Stat.* 631.

The growth of citrus in some soils makes them a less favourable medium for subsequent growth of the same crop. The feeder roots of citrus trees or seedlings grown in such soil show considerable decay. Certain fungi, primarily *Fusarium solani*, *Pyrenochaeta* sp. and *Fungus* D1, were found in greater concentration in old citrus soils than in adjacent soils never before cropped to citrus. Sterile culture technique and a sand medium were used in a study to determine the effect of these and other soil fungi found in the root zone of citrus trees, on germination of sweet orange seeds and development of the young seedlings. *Fusarium solani*, *F. oxysporum*, and *Cylindrocarpum radiclecola* caused decay of some of the seeds and injured the root tips of most of the seedlings. *Fusarium solani* and *Pyrenochaeta* sp., together, inhibited germination and caused

decay of all except one of 60 seeds tested. *Aspergillus ochraceus*, *Stemphylium piriforme*, and *Thielaviopsis basicola* tended to reduce root growth and cause enlargement of the root tips. Many other fungi under similar conditions were without effect. The results support the hypothesis that reduced growth of citrus in old citrus soils is partly caused by the establishment of a detrimental microbial population in the soil. [Author's summary.]

978. KLOTZ, L. J.

Gum diseases of citrus in California.

Circ. Calif. agric. Exp. Stat. 396, 1950, pp. 20, bibl. 12, illus.

"Here is the latest information available on the cause, prevention and treatment of gum diseases found in citrus trees in California." The most important of these is brown rot gummosis caused by *Phytophthora* spp. which attack leaves, blossoms and fruit, two species invading and destroying the bark of the trunk and rootstock. Citrus species are listed as highly susceptible, less susceptible, or resistant. The resistant forms mentioned are tangelo (tangerine × pummelo), sour oranges (*C. aurantium*), and the kumquats Marumi and Nagami (*Fortunella* sp.). The basic preventive measures include (1) keeping excess moisture from contact with trunks and crowns for extended periods, (2) keeping manure and other organic matter away from the bases of the trees, (3) spraying or fumigating only when conditions are favourable, and (4) making periodical inspections of the trees to spot infection before too much damage is done.

979. CHILDS, J. F. L.

Organic vs. copper fungicides for control of melanose.

Phytopathology, 1950, 40: 719-25, bibl. 9.

In trials for the control of melanose of citrus fruits, caused by *Phomopsis citri*, bordeaux mixture, tribasic copper sulphate and the cuprous oxides gave consistently good to excellent control. Copper zinc chromate complexes also gave good control. Of the organic materials used in the experiments, N5DS appears to be the only one worthy of further trial against melanose.—U.S. Subtropical Fruit Field Stat., Orlando, Fla.

980. METCALF, R. L., AND CARLSON, R. B.

Testing systemic insecticides against citrus pests.

Calif. Citrogr., 1950, 35: 506, 518, bibl. 6, illus.

A method of testing systemic insecticides against insect pests on citrus seedlings in water culture solutions is described. Para-oxon and octamethyl pyrophosphoramide (OMPA) have shown great systemic action in these trials and it is now considered that field experiments are justified. Experiments will be designed to find the duration of effectiveness of various concentrations, the best method of application, the possible toxicity of treated fruit and the effects on the soil of soil applications in the root zone. C.W.S.H.

981. SHAW, J. G.

*Eretmocerus serius* as a parasite of the citrus blackfly in Mexico.

J. econ. Ent., 1950, 43: 380-2, bibl. 4.

Studies conducted in 4 states in Mexico indicate that, while the parasite *Eretmocerus serius* controls the

citrus blackfly, *Aleurocanthus woglumi*, during rainy seasons, long periods of drought appear to be the adverse factor preventing normal increase and development of the parasite, thus allowing blackfly infestations to remain high and inhibit fruit production.

982. ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, N.S.W.

The bronze orange bug (*Rhoecocoris sulci-ventris*).

Agric. Gaz. N.S.W., 1950, 61: 303-4, illus.

This, a native species, causes much damage to citrus trees in some districts of New South Wales. The type of injury and the life history of the pest are outlined. The bugs may be controlled by soft soap or resin-soap spray in June and July. During the spring and early summer either a DDT emulsion or a derris spray may be used.

983. LIEU, K. O. V.

The study of wood borers in China. II. Biology and control of the citrus-trunk-cerambycids, *Nadezhdiella cantori* (Hope) (Coleoptera).

Notes Ent. chin. Mus. Heude, 1947, 11, fasc. 2, pp. 69-119, bibl. 21, illus., from abstr. in Rev. appl. Ent., 1950, 38: 266.

This paper, one of a series on longicorns of *Citrus* in Szechwan, contains an account of investigations carried out in 1939-43 on the bionomics and control of the cerambycid *Nadezhdiella cantori* which attacks the trunks.

984. FISHER, F. E.

Entomogenous fungi attacking scale insects and rust mites on citrus in Florida.

J. econ. Ent., 1950, 43: 305-9, bibl. 30.

At the present time, it may be concluded that one fungus, *Myiophagus* sp. Thaxter, is a true parasite and is acting as a factor in the biological control of purple and Florida red scales on citrus in Florida. No evidence has been found that the red-headed fungi, *Sphaerostilbe aurantiicola* (Berk. and Br.) Petch, *S. flammea* Tul., and *Nectria diploa* Berk. and Curt., are parasitic on red and purple scales. Two recently discovered fungi, *Hirsutella besseyi* Fisher and *H. thomsonii* Fisher, may be parasitic on purple scale nymphs and rust mites respectively; however, the parasitism of these two fungi remains to be proved. [Author's summary.]

985. ŠUTOVA, N. N.

A new entomophagous insect—a parasite of the scale insect *Leucaspis japonica*. [Russian.]

Priroda (Nature), 1950, No. 8, pp. 72-4.

An account of *Leucaspis japonica*, a scale insect infesting citrus and other subtropical plants, and of its endoparasite *Casca chinensis*.

986. HELY, P. C., AND LEVITT, E. C.

White wax scale control on citrus.

Agric. Gaz. N.S.W., 1950, 61: 307-10.

An account of investigations in Central Coast orchards into the control of the white wax scale, *Ceroplastes destructor*. It is concluded that white oils are safe to use and may be combined with bordeaux mixture for the control of black spot on Valencias. Such sprays



are also very useful in preventing the early build-up of other scale pests.

987. CARMAN, G. E., AND EWART, W. H.  
The use of parathion for the control of several citrus pests.

*Calif. Citogr.*, 1950, 35: 456, 474-5.

Although still in the experimental stage for use in citrus orchards, parathion is very promising as an insecticide, used either as a wettable powder or a dust mixture, for the control of scale insects and thrips, and possibly a number of other insects. Details of the applications suggested for use against each insect are given. In some cases, leaf drop has followed its application, but such injury has been rare and the amounts applied have not rendered the fruit unsafe for human consumption. C.W.S.H.

988. GRIFFITHS, J. T., AND FISHER, F. E.  
Residues on citrus trees in Florida: changes in purple scale and rust mite populations following the use of various spray materials.  
*J. econ. Ent.*, 1950, 43: 298-305, bibl. 8.

In Florida, during 1949, Valencia and Pineapple orange trees receiving sprays containing zinc sulphate, zinc sulphate plus lime, lime, pyrophylite, basic copper, and zinc carbonate were compared with non-sprayed trees. Two applications were made, one in the spring and a second one in the early part of June. All materials were used at both 4 and 8 lb. per 100 gal. of spray and no difference was found in the effectiveness of the two concentrations. From the data presented, it is concluded that sprays containing zinc and copper resulted in higher populations of purple scale, *Lepidosaphes beckii*, and rust mite, *Phyllocoptruta oleivora*, than did sprays containing lime or pyrophylite. All sprays resulted in higher scale and mite populations than were found on the unsprayed controls.

989. GRIFFITHS, J. T., JR., REITZ, H. J., AND OLSEN, R. W.  
Off-flavor produced in Florida orange juice after application of new organic insecticides.  
*Agric. Chemls.*, 1950, 5: 9: 41-3, 99, bibl. 1.

Benzene hexachloride, high gamma benzene hexachloride (from 97-98% pure gamma), chlordane, toxaphene, and parathion were sprayed at different dates on three varieties of citrus throughout the 1948 growing season. Taste tests were applied to both fresh and canned juice of oranges from these plots. It was found that only benzene hexachloride sprays regularly imparted off-flavours. A high gamma benzene hexachloride caused some off-flavour to orange juice when used with oil but not when used without oil as a wettable powder. Chlordane, toxaphene, and parathion, although used in dosages which were much higher than would ordinarily be used on citrus trees in Florida, did not impart any off-flavours to the varieties upon which they were used. It is concluded that, from the standpoint of off-flavour to juice, chlordane, toxaphene and parathion are safe to use on citrus in Florida; when fruit is present on the trees benzene hexachloride should not be used as a spray, and high gamma benzene hexachloride should be used as a wettable powder and not combined with oil.—Citrus Experiment Station, Lake Alfred, Florida.

990. ROCKLAND, L. B., UNDERWOOD, J. C., AND BEAVENS, E. A.  
Nitrogenous constituents of citrus-fruit juices.

*Calif. Citogr.*, 1950, 35: 490-2, bibl. 24.

Chromatographic methods of analysis have enabled a large number of nitrogenous substances, largely amino acids, to be detected in citrus fruit juices. A table is given showing those found in orange, grapefruit, lemon and lime. It is thought that deterioration in citrus juices is connected with the type and quantity of the amino acids present. The quantity of amino acids varies with the maturity of the fruit, so that further study of this relationship may result in the harvesting of fruit which will give juice less liable to deteriorate. C.W.S.H.

991. KIRPAL SINGH, K., AND SINGH, S.  
The development of red colour in blood red Malta orange (*C. sinensis* Osbeck.).  
*Indian J. agric. Sci.*, 1948, 18: 157-63, bibl. 8, illus. [received 1950].

This variety was introduced into the Punjab about 100 years ago and, apart from its general good quality, is popular for the red pigments in the flesh. The production of these pigments could not, however, be relied on. It had earlier been discovered that fruit on the south side of the trees produced less pigment. In the trials described in this paper it was shown that the red colour is influenced by (1) rootstock—the order of preference in this respect being Kharna Khatta, rough lemon, Jullunduri Khatti and sweet lime, (2) low temperature during ripening, (3) exposure to low temperatures after picking. Fruit stored for 14 weeks at 32-39° F. were 96% red-tinged. It is considered, therefore, that the previous marketing difficulties with this orange can be overcome by picking the fruit when they reach maturity and perfecting the colour by cold storage. C.W.S.H.

992. BOULAIS, J.  
Lavage des fruits par centrifugation. (A centrifuge for washing fruits.)  
*Fruits d'Outre Mer*, 1950, 5: 220-1, illus.

A pilot plant at the Station Centrale de l'Institut des Fruits et Agrumes is described and illustrated, in which the washing of fruits prior to storage or processing is carried out under strong agitation in a vortex of water circulating at a speed of 5 m./sec. This process was found to be more effective than washing by more orthodox methods and caused no damage to citrus fruits, tomatoes or potatoes.

993. HOPKINS, E. F., AND LOUCKS, K. W.  
A curing procedure for the reduction of mold decay in citrus fruits.  
*Bull. Fla agric. Exp. Stat.* 450, 1948, pp. 26, bibl. 10, illus. [received 1950].

In experiments described here, oranges were kept in the colouring room with and without the use of ethylene gas but with uniform conditions as regards temperature, relative humidity and air movement. It was found that a temperature of 86° F. with 90% relative humidity and continuous ventilation caused a marked "curing" effect which greatly reduced the susceptibility of the fruits to decay by penicillium moulds, whether or not ethylene was used. Possible reasons for this effect are discussed.

## 994. CAMPANILE, S.

Analisi del succo di mandarini affetti da *Cytosporina*, Camp. (Analyses of the juice of mandarins infected with *Cytosporina*.) *Ital. agric.*, 1950, 87: 460-1, bibl. 3, illus.

Analyses were made of mandarins, infected with *Cytosporina citriiperda*, received by the Rome market from Calabria. Data are tabulated for various parts of the affected fruit in relation to total sugars, citric acid, and the sugar: acid ratio.

## 995. SESSELER, W. M.

Oranjeappelschillen van Curaçao. (Orange peel from Curaçao.) [English summary  $\frac{1}{2}$  p.] Reprinted from *De West Indische Gids*, 1949, 30: 10: 289, being *Ber. Afd. trop. Prod. Kon. Ver. Ind. Inst. Amsterdam* 225, pp. 8, bibl. in text, illus.

A brief account is given of the development of the bitter orange industry of Curaçao, and a comparison made between the value of the orange peel exported from this island and of that from Haiti. In peel from Curaçao the concentration of oil is higher and the quality and odour are better. It is suggested that the difference in concentration is the result of climate. The importance of rapid drying and exporting is emphasized.

## 996. KESTERSON, J. W., AND McDUFF, O. R.

Florida citrus oils. Commercial production methods and properties of essential oils (1947-48 season).

*Bull. Fla agric. Exp. Stat.* 452, 1948, pp. 44, bibl. 26, illus. [received 1950].

The physical and chemical properties of 83 samples of cold pressed and distilled oils of orange, grapefruit, tangerine and lime were determined and are tabulated. Fruit variety, degree of maturity, and storage of fruit before extraction were found to affect significantly the chemical properties of expressed orange oil but not its physical characteristics to any marked extent.

*Eucalyptus.*

## 997. JIMÉNEZ, O.

El eucalipto, una maravilla forestal. (Eucalyptus, a valuable forest tree.) *Suelo Tico*, 1949, 2: 541-4, illus.

A popular account of the commercial value of the eucalyptus tree, especially *E. globulus*, and of its utilization in Costa Rica. The tree was introduced into that country about a hundred years ago, and thrives not only in the tropical regions but also at high altitudes and on the slopes of volcanoes. Extensive planting on barren hillsides, river banks and as wind-breaks is advocated.

## 998. LANE, C. R.

Viveiros e processos de repicagem de eucaliptos. (Nursery practices and transplanting methods for *Eucalyptus*.) [English and French summaries  $\frac{1}{2}$  p. each.] *Agron. angol.*, 1950, 3: 103-10.

Some species of *Eucalyptus* suitable for growing in the plateau regions of Angola are listed according to their uses. Methods of seed selection, preparation of seedbeds, sowing and transplanting are dealt with, and

the use of soil pots, the construction of which is described in detail, is advocated. The author suggests that such pots may also be used to advantage in the raising of coffee and horticultural plants.

## 999. DA FONSECA, J. P.

Experiências de combate químico a cupins subterrâneos no horto florestal de guaraní. (On the chemical control of underground termites [in seedling eucalyptus beds].) [English summary  $1\frac{1}{2}$  p.] *Arg. Inst. biol. S. Paulo*, 1949-50, 19: 57-84, bibl. 2, illus.

In some districts in Brazil underground termites are the most serious pest of eucalyptus. In experiments carried out at the Biological Institute of São Paulo with a number of insecticides and repellants, the following substances gave the best control: white arsenic, lead arsenate, Paris green, arsenic baits, and a mixture of carbolineum, naphthalene and diesel oil. From a practical point of view, 3% white arsenic is considered to be the most satisfactory.

*Passion fruit.*

(See also 1009.)

## 1000. ANON.

Woodiness (or mosaic disease) of passion fruit.

*Agric. Gaz. N.S.W.*, 1950, 61: 191-2, illus.

Control measures outlined here are directed towards providing favourable growth conditions and so prolonging the productive life of a plantation.

*Persimmons.*

(See also 181, 191, 1011g, 1194.)

## 1001. KIMURA, M.

Studies on the root system and reciprocal influence of stock and scion in some fruit trees. II. Kaki trees. [Japanese.]

*J. hort. Ass. Japan*, 1948, 17: 84-91, bibl. 31.

This is an account of grafting experiments with two varieties as scions on two rootstocks. The general results of observations during four years after grafting are as follows: The variety Prolific on *Diospyros lotus* grew well at first but declined in later years and eventually growth was very poor. The variety Seedless on *D. kaki* made little or no growth for 2 to 3 years after grafting, but after that growth accelerated and became good. Seedless on *D. lotus* and Prolific on *D. kaki* grew comparatively well, the former being especially good. The root systems of the four combinations are compared.

*Tung.*

(See also 1222.)

## 1002. DICKEY, R. D., BLACKMON, G. H., AND LAGASSE, F. S.

Cultural requirements of the mu-oil tree. *A.R. Fla agric. Exp. Stat. for 1948/49*, p. 92.

Eighty-six patch buds of mu-oil, *Aleurites montana*, failed to grow when inserted on 1-year-old candle-nut seedlings, *A. moluccana*, indicating that these species are not compatible.



1003. DROSDOFF, M.  
Suitability of various soils for tung production.  
*Circ. U.S. Dep. Agric.* 840, 1950, pp. 23, bibl. 22, illus.

Since the first large commercial orchard of *Aleurites fordii* was planted in 1924 the area under cultivation in this crop has expanded to about 166,000 acres, nearly all concentrated, as shown on a map, in a narrow belt bordering the Gulf of Mexico. Probably the most important soil requirement is good drainage. A relatively high nutrient- and moisture-holding capacity is desirable and moderately acid soil (pH 5.5 to 6.5) is probably more suitable than neutral or alkaline soil. Frost pockets and steep slopes difficult to cultivate without causing erosion should be avoided. The main soil types found in the tung belt are described briefly with notes on soil management and fertilizer practices.

1004. BADCOCK, W. J.  
Mulching.  
*Nyasaland agric. quart. J.*, 1949 (published August 1950), 8: 91-7, bibl. 8.

This is a short general review of mulching experiments. These have shown that soil mulches are rarely of direct value in aiding crop growth and when good results have followed their use, these, it is suggested, have been due mainly to the removal of weeds. Examples of the benefit of vegetable mulches in East Africa are given. In practically all mulching experiments crop yields have been increased and plant health and growth improved, and the practice is particularly recommended for permanent crops such as tung, coffee and citrus. Improvements obtained in annual crops may often, however, be uneconomic. C.W.S.H.

1005. WEBSTER, C. C.  
Fertilizer trials with tung trees (*Aleurites fordii*) in America.  
*Nyasaland agric. quart. J.*, 1949 (published August 1950), 8: 103-10, bibl. 13.

Experiments with various NPK mixtures applied direct on to a green manure crop are reviewed. N is the most important nutrient. It increases the girth of the trees, the number and length of the terminal shoots (on which the amount of fruit directly depends) and the number of fruits per terminal. Oil percentage is decreased but percentage of kernel in the fruit is increased. Except on very deficient soils  $P_2O_5$  is only required if N manuring leads to heavy  $P_2O_5$  demands on the soil. The same applies to K, though deficient soils are fairly common. K increases the oil percentage of the kernel and the percentage of kernel to fruit. C.W.S.H.

1006. DROSDOFF, M.  
Minor-element content of leaves from tung orchards.  
*Soil Sci.*, 1950, 70: 91-8, bibl. 5.

In a representative range of leaf samples from tung orchards in the southern states of the U.S.A., including some showing symptoms of deficiency or excess (B only), the following range of contents was found: Zn 10 to 229 p.p.m., Cu 2.5 to 12.4, Mn 25 to 2,884, B 38 to 226 and Fe 35 to 92.

1007. DICKEY, R. D., AND BLACKMON, G. H.  
Propagation, planting and fertilizing tests with the tung-oil tree.  
*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 87-8.

The foliage of 4-year-old trees was burned by applications in 1946 of 1, 2, 4 and 8 oz. borax per tree, and in 1947 and 1948 further burning occurred although no more borax was supplied. In 1947 as little as  $\frac{1}{4}$  to  $\frac{1}{2}$  oz. borax caused slight burning on similar young trees, and damage was also caused in 18-year-old trees by  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 and 2 lb. per tree. The warm winter of 1948-49 indicated that tung has a definite chilling requirement, 160 hours at 45° F. or less being insufficient to prevent delayed foliation.

1008. DICKEY, R. D., DROSDOFF, M., AND HAMILTON, J.  
Copper deficiency of tung in Florida.  
*Bull. Fla agric. Exp. Stat.* 447, 1948, pp. 32, bibl. 17, illus. [received September, 1950].

Copper deficiency was first observed in tung trees, *Aleurites fordii*, in Florida in 1941. Symptoms, which are described in detail with the aid of photographs, are chlorosis, dwarfing and "cupping" of the leaves, marginal burn of the terminal leaves and premature abscission of some of the leaves. Shoots show reduced growth, dead buds and die-back. In control experiments made between 1941 and 1947 applications of copper sulphate proved equally effective, whether applied to the soil dry or in solution or sprayed on the foliage. In 8-year-old trees the deficiency was corrected by soil applications of  $\frac{1}{2}$  to 1 lb. dry salt and by as little as 1 oz. in 1 pint of water. In badly affected 1-year-old trees  $\frac{1}{2}$  oz. in  $\frac{3}{4}$  pint of water proved sufficient, and 3 oz. applied dry produced a considerable improvement. Copper-lime foliage sprays produced complete control provided all the foliage was covered, and a single application gave control for a whole season provided the highest concentration, 8-8-100, was used; renewed spraying was, however, necessary each year. Marked variation in susceptibility to deficiency was found in a trial involving 6 budded varieties and 7 seedling progenies, but there was no significant difference between the deficiency score of the budded trees and the seedlings. Leaf analyses on mid-shoot leaves collected in late summer showed deficient leaves to contain 3 p.p.m. Cu or less and normal leaves 4 p.p.m. Cu or more; in both classes of leaf the Cu content tended to increase late in the season. In areas low in Cu, the higher the level of N applied the more severe was the Cu deficiency; the application of superphosphate, however, had no adverse effect on Cu uptake by the trees.

#### Other crops.

(See also 1194, 1234.)

1009. COBIN, M., AND RUEHLE, G. D.  
Sub-tropical crops of minor economic importance.  
*A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 245-7.

Naranjilla, *Solanum quitoense*, was successfully cleft grafted on to *S. macranthum*. Cherimoya, *Annona cherimola*, was successfully grafted on to *A. squamosa*, *A. reticulata* and *A. montana*. In germination tests on macadamia nuts a 50-50 mixture of screened peat and sphagnum moss and a sterilized, grey, fine, acid sand gave similar results (about 75% after 4 months) with small-sized nuts; the percentage germination tended to improve as size of nuts increased. A temperature of 30° F. on 1-2 January did not affect *Passiflora edulis*, *P. edulis* var. *flavicarpa* or *P. laurifolia*, but killed plants of *P. quadrangularis*. Selections of Barbados cherry were propagated vegetatively [method not stated]. Seedlings of bitter- and sweet-fruited white sapotes were grafted with sweet-fruited scions to determine rootstock effect on fruit quality. A superior sweet-fruited carambola was successfully cleft-grafted on seedlings of  $\frac{1}{2}$  in. diameter. Air-layering proved a satisfactory method of propagating selections of *Antidesma bunius*. Yields of *Aleurites trisperma* ranged from 2.5 to 28 lb. of husked nuts per tree; both side-veneer and cleft-grafting on to 5-month-old seedlings gave 100% takes when terminal scion shoots were taken in March when the trees were leafless and dormant. Among many other fruits mentioned are tree tomato, loquat, papaya, seeded and seedless breadfruit, arabica coffee and several bamboo species.

#### 1010. PORTOLANO, N.

La scozzolatura del fico d'India. (Removing the flowers of the Indian fig.)

*Ital. agric.*, 1950, 87: 558-60, illus.

The custom of removing the early flowers of the Indian fig [*Opuntia ficus-indica*] is described. The results of removing these flowers, at three stages of development, on the later flowering, show that reflowering is most prolific with pre-blossom and least with post-blossom deflowering.

## TROPICAL FRUIT AND PLANTATION CROPS.

### General.

(See also 501, 1199, 1244b, e, h.)

#### 1012. STEWART, A. B.

Memoranda on colonial fertilizer experiments. 1. Planning and conduct of fertilizer experiments.

CROWTHER, E. M.

Ibid. 2. Fertilizer experiments in colonial agriculture.

*Colonial* 214, 1947, pp. 3-9, bibl. 3, and pp. 10-28, published by H.M. Stationery Office, 6d. [received 1950].

The first memorandum is based on a "Report on soil fertility investigations in India with special reference to manuring" and considers the planning and conduct of fertilizer experiments under the following heads: (1) General observations, with particular reference to (a) factors affecting crop growth and (b) the need for field experiments. (2) Types of field experimentation: (a) simple experiments in cultivators' fields and (b) detailed experiments at carefully selected centres.

### Noted.

1011.

a FUGGET, K. A., BAYTON, J. A., AND BITTING, H. W.

Citrus preferences among customers of selected stores.

*Bull. Tex. agric. Exp. Stat.* 722, 1950, pp. 48.

b MACDONNELL, L. R., AND OTHERS.

The specificity of pectinesterases from several sources with some notes on purification of orange pectinesterase.

*Arch. Biochem.*, 1950, 28: 260-73, bibl. 22.

c PHILLIP, A. G.

Irrigation of orange groves.

*Punjab Fruit J.*, 1950, 14: 13-15, illus.

d PODOPRIGODA, G. A.

A note on citrus growing in Dagestan. [Russian.]

*Sad i Ogorod* (Orchard and garden), 1950, No. 7, p. 43.

e REBOUR, H.

L'arboriculture fruitière en Afrique du Nord. (Fruit growing in [French] North Africa.)

*Jardins Fr.*, 1950, 4: 206-16, illus.

f REBOUR, H.

L'agrumiculture dans les pays méditerranéens. Problèmes techniques et économiques. (Citriculture in the Mediterranean countries. Technical and economic problems.)

*Fruits et Prim.*, 1950, 20: 229-32.

g YAMAMOTO, W.

On a brown sooty mould, *Phaeosaccardinula javanica* (Zimm.) comb. nov. on persimmon [in Formosa]. [Japanese, English summary.]

*Ann. phytopath. Soc. Japan*, 1940, 10: 254-69, from abstr. in *Jap. J. Bot.*, 1941, 11: (126) [received 1950].

(3) Experimental treatments, under which are considered (i) the form of fertilizer supplement, (ii) the rates, times and methods of application, (iii) trace elements, (iv) the use of fertilizers in the production of humus and (v) the choice of treatments in individual experiments. The second memorandum deals with fertilizer experiments where little previous information is available. In colonial territories experimentation is often well advanced. It is recommended that analogies should not be lightly drawn between needs in temperate and in tropical conditions but that, on the other hand, treatments beneficial in temperate climates should at least be tried out in the tropics. In particular, local supplies of phosphate are often poor and no substitute for superphosphate. In the actual experiment factorial designs are recommended, often with confounding or fractional replication, both of which are simply but adequately explained. The 2<sup>nd</sup> and 3<sup>rd</sup> designs are both considered as well as the comparison of alternative forms of fertilizer, the use of bulky organic manures and the plant's need of minor elements.

S.C.P.



1013. GOSSWEILER, J.  
Flora exótica de Angola. (The exotic flora of Angola.) [English and French summaries  $\frac{1}{2}$  p. each.]  
*Agron. angol.*, 1948, 1: 121-204; 1949, 2: 173-255; 1950, 3: 143-67.

A complete inventory of non-indigenous plants grown in Angola, either as economic crops, ornamentals or garden plants, giving the common Portuguese names and notes on the origin, distribution and uses of the plants.

1014. PY, C.  
La production fruitière des îles Hawaii.  
(Fruit growing in Hawaii.)  
*Fruits d'Outre Mer*, 1950, 5: 244-53, bibl. 30, illus.

Dealing with papaw and macadamia nuts in some detail and more briefly with bananas, mangoes and avocados.

1015. VAN DER GIESSEN, C., AND OTHERS.  
Wetenschappelijke bevordering van de landbouw in de laatste honderd jaren. (Scientific advancement in agriculture in the last hundred years.)  
*Chron. Nat.*, 1950, 106: 246-75, bibl. 39.

The most important advances that have been made in the culture of rice, sugar cane, tobacco, tea, coffee, cacao, coconuts, cinchona and rubber in the Dutch East Indies are reviewed by various authorities.

1016. SARAVIA, M.  
Fuerzas en marcha. (Strength in progress.)  
[The development of industry and agriculture in El Salvador.]  
[Publ.] *Minist. Agric. Guatemala*, 1949, pp. 138.

In a series of 42 short articles the author discusses the social, economic and geographic problems of El Salvador, a small, much over-populated country with a primitive system of agriculture, and develops the thesis that industrialization of agriculture is its only hope of survival. In reviewing the natural resources of the country, he deals with the economic importance and the possibility of increasing production of the following crops of horticultural interest: coffee, balsam, indigo, henequen, cacao, oil plants, pineapples, subtropical fruits, cinchona and eucalyptus.

1017. RANGHEL GALINDO, A.  
Las barreras vivas en la conservación del suelo. (The use of vegetation barriers in soil conservation.)  
*Agric. trop. Bogotá*, 1949, 5: 7: 33-40, bibl. 6, illus.

On sloping land, strips of close-growing crops planted along the contours between strips of the main cultivated crop will help to prevent erosion by reducing the flow of the run-off water and by allowing the build-up of soil ridges. Suggestions are made for suitable strip crops to be grown in coffee plantations, citrus groves, etc., where the shade is heavy, and in open fields of tobacco, cotton, yucca, plantains or pineapple. The relative advantages of the various strip crops are discussed and directions given for their spacing, establishment and management.

1018. MULLER, A. S.  
A preliminary survey of plant diseases in Guatemala.

*Plant Dis. Reptr.*, 1950, 34: 161-4, bibl. 5.  
Listed under garden crops, field crops, fruit (including a number of tropical fruits) and flowers.

1019. TREHAN, K. N., TALGERI, G. M., AND DHARESHWAR, S. R.  
Control of "red ants" (*Oecophylla smaragdina* Fab.).  
*Proc. Indian Acad. Sci., Sect. B*, 1949, 30: 338-42.

The red ant, *Oecophylla smaragdina*, is liable to be a serious nuisance while harvesting crops of mango, guava, chickoo [sapodilla] and other fruit trees. Trials during 2 years at the Ganeshkhind Fruit Experimental Station (Kirkee) and at Modibag (Poona) are described in which good control was obtained by dusting the nests after piercing, followed by dusting of the whole trees, with 5% Hexyclan (0.65%  $\gamma$ -BHC), 5% Gammexane (0.65%  $\gamma$ -BHC) and 5% DDT. The addition of sulphur at 2:1 did not detract from the effectiveness of the materials and kept trees uninfested for over 12 weeks. With sulphur added, 5% Hexyclan was the most economical insecticide.

1020. REES, W. J.  
The giant African snail; its history, habits and control, together with some general recommendations for its control.  
*Rep. Colonial Office*, 1950, pp. 16, bibl. 39.

The giant African snail, *Achatina fulica*, originally a native of East Africa, is now widespread in the Indo-Pacific, and in some areas is a serious pest of fruit trees, vegetables and flowers. In a review of the literature its life history and habits are described and control measures discussed under: (1) Chemical control: poisoned limewash, meta-bran baits and the use of copper sulphate; (2) Collection and destruction, including hand-picking and crushing; (3) Other measures: the destruction of refuse, clean cultivation and the protection of individual trees. (4) Biological control.

#### Bananas.

(See also 225, 1079.)

1021. GOVINDASWAMI, S.  
Doubling of chromosomes in the root tips of *Musa*.  
*Curr. Sci.*, 1950, 19: 255, bibl. 1, illus.

Doubling of the somatic chromosomes was observed in root tip cells of *Musa sanguinea*, a wild species, and in the seedless diploid variety Safet-velchi, *M. paradisiaca*.

1022. PORTÈRES, R.  
La maladie physiologique de l'éventail foliaire et de l'engorgement du stipe des bananiers dans l'Ouest africain. (A physiological disease of bananas in [French] West Africa affecting the spread of the leaves and the top of the pseudo-stem.)  
*Fruits d'Outre Mer*, 1950, 5: 208-13, bibl. 4, illus.

Two malformations of bananas are a common sight in the *Musa sinensis* plantations of French West Africa: (1) A failure of the leaves to emerge one above the

other and to spread in the usual manner and (2) a constriction at the top of the pseudo-stem with swelling below this point at the time the inflorescence is due to emerge. The resultant bunch may also be deformed. The constriction at the top of the pseudo-stem naturally impedes the emergence of the inflorescence. If the growth of the latter proceeds slowly, the top is pierced gradually and no deformation occurs. In the case of a sudden flush of growth, however, the inflorescence, unable to free itself immediately, causes a swelling in the pseudo-stem. Many observations in the field and the fact that transplants from affected stools do not show the disease, if planted in a healthy area, suggest that the cause is physiological. There are several factors which may affect the incidence of the trouble and the appearance of particular symptoms: (1) climatic: a drop in temperature, excess or lack of rain, flooding, lack of sunshine or desiccating winds; (2) compacting of the surface soil; (3) defoliation by locusts, destruction of the roots by eelworms or *Rhizoctonia bataticola*, and a disease of the sheaths caused by *Marasmius stenophyllus*; (4) cultural: excess or lack of drainage and irrigation, etc. The seasonal occurrence of the disease in different parts of Africa is indicated.

1023. I.F.A.C. [INSTITUT DES FRUITS ET AGRUMES COLONIAUX].

Effets de *Cercospora musae* sur *Musa sinensis* (Variété Grande Naine). (The effect of *Cercospora musae* on *Musa sinensis*.)

Fruits d'Outre Mer, 1950, 5: 200, bibl. 3 plus coloured plate.

The effect of *Cercospora* leaf spot on fruits of the Grande Naine variety of *Musa sinensis* is illustrated in a colour plate, which compares a banana from an affected plant with a healthy fruit on their arrival in France.

Cacao.

(See also 1187t, 1196, 1219.)

1024. RIVERA H., R.

El cultivo del cacao en Antioquia. (Cacao growing in Antioquia [Colombia].)

Agric. trop. Bogotá, 1949, 5: 6: 37-8.

A summary of the programme initiated by the Ministry of Agriculture in Colombia to increase the production of cacao in the department of Antioquia where there is still a serious production deficit, 3,211,923 kg. being imported in 1948. The programme includes the establishment of nurseries for the propagation of high yielding clones and suitable shade trees, control of diseases, especially *Monalonium dissimulatum*, and the elimination of self-incompatible trees.

1025. ROSENDO VELASQUEZ, B.

El cultivo del cacao. (Cacao growing [in Costa Rica].)

[Mimeo Publ.] Minist. Agric. Guatemala No. 25, 1950, pp. 38, bibl. 8.

A report of observations on the characteristics, requirements and methods of culture of the cacao tree made at the Interamerican Institute of Agricultural Sciences at Turrialba, Costa Rica, and on the experimental farm "La Lola". The report includes a short account of the history and distribution of the cacao industry,

control of pests and diseases, and preparation of the crop for market.

1026. EVANS, H.

Report on cocoa investigations in progress in Trinidad with a summary of results achieved to date.

Rep. Cocoa Conf. London, 1950, Cocoa, Choc. and Confect. Alliance Ltd., 1950, pp. 20-31, illus.

Investigations carried out during the past two years in Trinidad on cocoa physiology (the author's own field) is reviewed in some detail while work on cocoa breeding and on diseases is summarized. *The maintenance of cocoa seed in viable condition for transport purposes:* The results of trials are outlined [for a more detailed account, see H.A., 20: 3212]. *Investigations on the propagation of cocoa:* The best single root-inducing hormone so far tried is indolebutyric acid, though a mixture of this substance with alpha-naphthaleneacetic acid in equal proportions has given somewhat better results. In trials with leafless cuttings which will not produce roots even under optimal conditions, rooting was induced by introducing extraneous supplies of nutrients, notably sucrose. This method has also been applied successfully to I.C.S. clones that normally form roots very slowly, and to certain wild types of cocoa such as *Theobroma angustifolia* and *T. grandiflorum* that are inherently difficult types to root. Studies are described on the influence of external factors on the rooting of cocoa cuttings, namely light, temperature and the air/water relations of the rooting medium, the last-named being the most critical of these factors. In considering internal factors influencing the rooting of cuttings it has been found that material that had been exposed to too much or too little light was unsuitable, as was material from plants suffering from deficiencies of N, Fe and Mn. Procedures for the large-scale production of rooted plants have been improved to the point at which almost 100% rooting of single-leaf cuttings is obtained in 3 weeks in sawdust compost in propagators, the cuttings being hardened off *in situ*. Excellent results have also been obtained with stem cuttings in outdoor beds under a mist spray provided by a new type of T-jet nozzle delivering 2-3 gal. per hour. The hardening-off of cuttings and the composition of the potting medium have also been investigated. *Studies in the mineral nutrition of cocoa:* By the use of the interveinal injection method developed by Roach at East Malling it was shown that deficiencies of N, Fe, Mn, Mg and Ni were of frequent occurrence in parts of Trinidad. Robusta coffee also responded to Mo and Co. [This is the first reference we have seen to cobalt deficiency in plants.—ED.] Particular attention has been paid to Fe deficiency and variation in the susceptibility of the I.C.S. clones has been noted.

1027. MONTSERIN, B. G.

Subsidised rehabilitation with clonal cocoa.

Rep. Cocoa Conf. London, 1950, Cocoa, Choc. and Confect. Alliance Ltd., 1950, pp. 31-7, illus.

Following an account of the history of the cocoa industry in Trinidad during the past 30 years and the cocoa rehabilitation scheme started in 1936, a description is given of the lay-out and methods of large-scale propagation by cuttings at the La Pastora propagating



station. In 1949 approximately 200,000 plants were distributed and the estimated requirement for 1950 is 350,000.

1028. VELAZQUEZ B., R.

El injerto en el *Theobroma cacao* L. (Cacao budding.)

*Suelo Tico*, 1950, 4: 87-9.

A method of patch budding, recently perfected at the Interamerican Institute of Agricultural Sciences, Turrialba, that can be used for the renovation of old cacao plantations, is described. Chupons, 1 or 2 years old and 1.5 to 3.5 cm. in diameter, preferably coming from the base of the tree, are patch-budded by the inverted U method, the vertical cuts being 1.5 cm. apart and 4.5 cm. long. The budsticks of clonal material should not be more than 1 year old, and are prepared by cutting off the leaf blades 8 days previous to budding. If they have to be transported far, the ends should be sealed with paraffin wax and the sticks packed in moist sawdust or moss. Speed during the budding operation is essential; it should not be done during rain nor in very strong sunshine. The wound is tied with tape treated with a mixture of 1 part beeswax to 2 parts paraffin. After budding, the chupon is headed back to 10 cm. above the bud, and the shoots arising from it are periodically removed.

1029. MACDONALD-SMITH, S.

The swollen shoot campaign in the Gold Coast.

*Rep. Cocoa Conf. London, 1950*, Cocoa, Choc. and Confect. Alliance Ltd., 1950, pp. 6-8.

WALKER, R. E.

Disease control and rehabilitation in the special area.

*Ibid.*, pp. 8-11, plus 3 maps.

LINTON, R. D.

Swollen shoot control in other areas and rehabilitation progress in general.

*Ibid.*, pp. 11-13.

Compulsory powers were granted towards the end of 1949 for the cutting out of swollen shoot-infected cacao in the Gold Coast. The progress of the campaign, which is being carried out on a large scale, is described in these three papers. The country is divided into two areas: the Special Area which contains the whole of the area of mass infection, and the General Area in which infection is slight and scattered. The object of the campaign has been to establish a disease-free belt along the edge of the Special Area and steadily to widen this belt by working inwards towards the centre. Concurrently the scattered outbreaks in the General Area are being brought under control as rapidly as possible. The progress made so far is considered to be satisfactory in view of the difficulties that have had to be overcome.

1030. JOHNS, R., AND GIBBERD, A. V.

An assessment of swollen shoot disease in Nigeria and an outline of some problems in connection with the rehabilitation of the cocoa industry.

*Rep. Cocoa Conf. London, 1950*, Cocoa, Choc. and Confect. Alliance Ltd., 1950, pp. 14-17, plus 2 maps.

The areas in which swollen shoot must be regarded as endemic in Nigeria are limited to the Ibadan Division and are indicated on a map. It is estimated that some 25 million trees are growing in the area, and it is doubtful whether the official cutting-out policy will be successful over so large an area with almost universal opposition from the farmers. The alternative is to create a "cordon sanitaire" on the eastern perimeter and so protect other cacao areas in which the disease has not appeared at all or on such a small scale that it has been successfully eradicated. Problems relating to the rehabilitation and replanting of cut-out areas are discussed.

1031. KIRKPATRICK, T. W.

Insect transmission of cacao virus disease in Trinidad.

*Bull. ent. Res.*, 1950, 41: 99-117, bibl. 23.

Two strains of a virus disease, "A" and "B" (*H.A.*, 19: 1538), which may be two distinct viruses, occur on cacao in Trinidad. They are compared with the more virulent "swollen-shoot" and related viruses of West Africa. The Trinidad and West African viruses are both carried exclusively by mealy bugs of the family *Pseudococcidae*. The virus symptoms in Trinidad are mostly a transient red vein-banding, with or without a more or less discontinuous yellow vein-flecking, and, on certain varieties of cacao, red-mottle on the pods. Swellings on the shoots have not been observed in Trinidad. Four species of mealy bug are known to be vectors: *Pseudococcus citri*, causing most of the natural spread; *P. brevipes*; a species resembling *P. brevipes* but almost certainly distinct; and *Ferrisia virgata*. Transmission experiments have been made using Posnette's technique (*H.A.*, 18: 2220) of feeding potential vectors. The time for which the mealy bugs feed on the virus source has little if any effect on their capacity for transmitting the virus. They can still transmit it if they are starved after infection-feeding for a period up to 22½ hours. Few experiments have yet been made with the virus strain "B" but it has been transmitted with *P. citri* and *P. brevipes*.—*Imp. Coll. trop. Agric.*, Trinidad, B.W.I.

1032. OTOYA, F. J., AND ROJAS PEÑA, E.

La "escoba de bruja" en la Intendencia del Meta. (Witches' broom [of cacao] in the del Meta district [Colombia].)

*Agric. trop. Bogotá*, 1949, 5: 6: 47-53, illus.

An account is given of the findings and recommendations of a commission set up to investigate the reported appearance of witches' broom disease (*Marasmius perniciosus*) in the del Meta district of Colombia. The district is isolated and the agricultural practices, described in some detail, very primitive. It is considered that the area is highly suitable for the production of cacao, and few of the pests and diseases commonly found in Colombia were observed there. Although the presence of the witches' broom fungus was not confirmed, typical symptoms were observed in 3 holdings. Control measures that could be applied if it were proposed to expand the industry, and alternative crops if this were not considered advisable, are suggested.

## 1033. BARQUERO, H.

Factores que afectan la calidad del cacao producido en varias fincas de la Zona Atlántica de Costa Rica. (**Factors affecting the quality of cocoa produced on different estates on the Atlantic coast of Costa Rica.**) *Suelo Tico*, 1949, 3: 243-9, illus.

A summary of an investigation carried out in 1948 by the Cacao Centre of the Interamerican Institute of Agricultural Sciences at Turrialba to determine the reasons for the variations in flavour of chocolate produced from 12 different cacao estates in Costa Rica. It was found that quality could not be judged by the external appearance of the beans; tasting tests were the only sure criteria. The type of cacao grown and cultural practices were found to have little effect on the flavour of the chocolate produced, but the method of fermentation and drying was all-important. Fermentation for 70 hours in a cubical container, or for 96 hours in a rectangular container is recommended. During fermentation the beans should be protected from rain and cold draughts. The time of fermentation can be reduced by the use of covered containers.

*Cloves.*

## 1034. SHEFFIELD, F. M. L.

**The clove trees of the Seychelles.**

*E. Afr. agric. J.*, 1950, 16: 3-8, bibl. 10.

As sudden-death disease had not been recorded in the Seychelles a visit was paid to the islands to compare the clove trees there with those growing in Zanzibar and Pemba where sudden-death disease is prevalent. The history of clove growing in the Seychelles is recounted. Many trees have been cropped for leaves for oil distillation. With the exception of those which have been over-cropped for leaves the trees are very healthy and comparatively free from insect pests and diseases. It is considered, however, that the good growth of the trees may be partly due to genetic causes, since the Seychelles cloves resemble those of Penang rather than those of Zanzibar. The trees were examined for characters found in Zanzibar which were not typical of dicotyledons and might be connected with sudden-death disease. All these characters were found in the Seychelles cloves and it was therefore concluded that none of those so far observed in Zanzibar cloves could be regarded as diagnostic of sudden-death disease. It is suggested that, in Zanzibar, clove wood might be made use of, and that penning might not prove fatal as has been generally believed. C.W.S.H.

*Coconuts.*

## 1035. CHILD, R.

**Recent research on the coconut palm with special reference to Ceylon.**

*Emp. J. exp. Agric.*, 1950, 18: 177-89, bibl. 62.

In a review of the literature on coconuts and particularly that relating to Ceylon, the author briefly discusses the following: The control of pests and diseases, notably bud-rot, tapering and nut-fall; genetics, seed selection and germination; manurial and cover cropping experiments; and size of nut and oil content.

## 1036. LIYANAGE, D. V.

**Sex life of the coconut palm.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 33-5.

The morphology of the coconut inflorescence is described and an account is given of the conditions under which the female flowers of tall, dwarf and King coconuts are fertilized. C.W.S.H.

## 1037. CHEYNE, O. B. M.

**Planting coconut seedlings.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 25-8, illus.

The recommended planting distance under ordinary conditions is 26 ft.  $\times$  26 ft., with 30 ft.  $\times$  30 ft. on cross-drained low-lying areas and 24 ft. or 22 ft. in dry, sandy districts; triangular being preferable to square spacing. Holes should be 3 ft. or 4 ft. cubes filled with a layer of husks, covered, to within 6-8 in. of the surface, by mixed top soil and wood ash. In selecting seedlings from the nursery the most vigorous of those between the ages of 6 and 12 months should be taken and the rest discarded. After-care is of great importance and includes weeding, protection from cattle, watering in time of drought and protection from termites by PDB or Gammexane. C.W.S.H.

## 1038. CEYLON COCONUT RESEARCH SCHEME.

**Planting systems. An enquiry ordered by the Board of Management of the Coconut Research Scheme.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 29-31.

Planting distances used in Ceylon have varied according to the soil but no experimental evidence is available as to the optimum distance for each soil type. To avoid laying down larger numbers of costly experiments it is proposed to gain information by means of a questionnaire to planters, which is reproduced here. C.W.S.H.

## 1039. GORRIE, R. M.

**Soil and water conservation in coconut growing.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 17-18.

The general impression that erosion from flat land is insignificant is contested. It is recommended that erosion on flat and gently sloping coconut holdings should be prevented by preserving natural covers, trenching along the contour, growing additional ground covers, and dumping husks, leaves and other vegetable matter in trenches. C.W.S.H.

## 1040. FERNANDO, L.

**Some methods of rejuvenating coconut plantations now practised.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 19-23.

Rejuvenation by a gradual process of removing senile palms and replanting is carried out to a small extent in village and middle-class holdings in Ceylon but is generally unsatisfactory owing to ignorance of the proper methods of planting. On estates, however, satisfactory underplanting has been carried out, all the old palms being removed between the first and sixth year after replanting. In some old but high-yielding estates it may be better to replace senile palms gradually. C.W.S.H.



1041. COOKE, F. C., NATHANAE, W. R. N., AND LIYANAGE, D. V.

**The tapering disease of coconuts—II.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 9-15, illus.

The view that this disease is not caused by a pathogen is supported by work done on the "wilt (root disease) disease" of coconuts in Travancore, the symptoms of which are almost exactly similar to those of quick-tapering disease. In Ceylon two distinct forms of tapering are recognized. (1) Slow-tapering has been shown to be due to unfavourable cultural conditions, e.g. erosion, impenetrable subsoil, waterlogging, soil hardening or the formation of termite hills. This condition of tapering may be cured or reduced by the removal of one or other of these causes. (2) Quick-tapering results in the death of the palm in 4 or 5 years. This condition is under investigation and there are indications that ill-balanced fertilizer mixtures (particularly excessive amounts of nitrogen) and lack of sodium, magnesium and boron, are among the possible causes.

C.W.S.H.

1042. COOKE, F. C.

**Insect pests on stored copra.**

*Ceylon Coconut Quart.*, 1950, 1: 2: 37-8.

Measures are outlined to prevent copra becoming infested with insects during storage and shipment.

*Coffee.*

(See also 1004, 1187f, k, m, v, 1229, 1241.)

1043. CASSIDY, M. A.

**Coffee growing in S. Rhodesia.**

*Rhod. agric. J.*, 1950, 47: 176-80, bibl. 4, illus.

The areas most suited to coffee in S. Rhodesia are the mountainous regions along the eastern border. Information, based partly on experience elsewhere, is given on climate, soils, shade trees, varieties, yields, propagation by seed, planting, mulching and cultivating, pruning, irrigation, manuring, harvesting and preparation. The most promising variety is the copper-tipped Blue Mountain arabica coffee. Particular emphasis is placed on mulching and the adoption of multiple stem pruning. The most destructive pest in S. Rhodesia is the coffee stem borer, *Anthonus leuconotus*, for which the following control measures are adopted: Collection and destruction of adults from November to the end of February; uprooting and burning of dead wood; clearing tunnels with wire, inserting cotton wool soaked in petrol and sealing.

1044. SERRA, G., AND PIÑERO, M.

Estudio de la explotación económica de fincas de café en Puerto Rico, 1946-47. (The economic position of coffee planting in Puerto Rico, 1946/47.) [English summary pp. 3½.]

*Bol. Estac. exp. agríc. Río Piedras* 87, 1949, pp. 51.

The results of a survey of the economic position and factors affecting production in the coffee plantations of Puerto Rico point to the need for a scheme for the permanent rehabilitation of the industry. Nearly half the farms are mortgaged, soil fertility in the coffee-growing region is generally low, and means of

transport are poor. Considerable improvement is needed in the efficiency of production through the use of improved varieties, machinery and chemical weed-killers. Control of the size of the farms and a greater diversification of crops would make for a better utilization of land. The poorer lands could be devoted to pasture, and there are good prospects for an expanded dairy industry in the coffee region. Suggestions are made for improving the methods of marketing, processing, and distribution of the secondary crops grown on the coffee farms, the most important of which are bananas, oranges and sugar cane.

1045. MENDES, A. J. T.

**Observações citológicas em *Coffea*. XII.**

Uma nova forma tetraplóide. (Cytological observations on *Coffea*. XII. A new tetraploid form.) [English summary ½ p.]

*Bragantia*, 1949, 9: 25-34, bibl. 6, illus.

A very vigorous and productive coffee plant growing in a plantation in the state of São Paulo, Brazil, was found to be a self-sterile tetraploid ( $2n=44$ ), and a study of its genetical characters indicated that it was probably a hybrid between *C. arabica* and *C. dewevrei*.

1046. MEDINA, D. M.

**Observações citológicas em *Coffea*. XIII.**

Observações preliminares em *Coffea arabica* L. var. *rugosa* K.M.C. (Cytological observations on *Coffea*. XIII. Preliminary observations on *Coffea arabica* var. *rugosa*.)

[English summary ½ p.]

*Bragantia*, 1949, 9: 47-51, bibl. 8, illus.

The results of this investigation show that *C. arabica* var. *rugosa* is a tetraploid plant, and that the roughness of the leaves is not due to differences in the polyploid nature of the component leaf layers.

1047. SÁENZ MAROTO, A.

Clasificación botánica del cafeto con especial referencia al *Coffea arabica* L. (A botanical classification of coffee, with special reference to *Coffea arabica* L.)

*Suelo Tico*, 1949, 2: 175-87, bibl. 6, illus.

The classification of the genus *Coffea*, proposed by A. Chevalier in 1940 and modified by him in 1942, is presented. The botanical characteristics of the subgenera, *Paracoffea*, *Argocoffea*, *Mascarocoffea* and *Eucoffea*, and of the various types of *Eucoffea* are tabulated, and the geographical distribution of the species is noted. Five maps showing the distribution of the various subgenera and species, and the probable districts of origin of the varieties of *Coffea arabica*, are unfortunately too poorly reproduced and on too small a scale to be intelligible.

1048. KRUG, C. A.

Mutações em *Coffea arabica* L. (Mutations in *Coffea arabica*.)

*Bragantia*, 1949, 9: 1-10.

The types of mutation occurring in *Coffea arabica* are discussed and classified as genic, chromosomal and cytoplasmic. Five cases are mentioned in which an interaction of genetic factors is involved, and the occurrence of somatic mutations giving rise to genetic chimaeras is noted. Finally, mutations of economic value are described.

1049. MENDES, J. E. T.

Ensaio de variedades de caféeiros II.  
(Variety trials with coffee. II.) [English  
summary  $\frac{1}{2}$  p.]

*Bragantia*, 1949, 9: 81-101, bibl. 2.

The results are summarized of a long-term trial carried out at the Central Experimental Station, Campinas, with 6 varieties of *Coffea arabica*. The fruits of Amarelo de Botucatu were regularly the first to ripen, followed by those of Nacional and Sumatra, Bourbon and Bourbon amarelo, and Maragogipe, in that order. Maragogipe produced the largest beans, while Bourbon amarelo and Bourbon produced the smallest. With all varieties except Maragogipe, alternate bearing was observed. On the basis of total production for the period 1935-46, the most productive variety was Bourbon amarelo, followed closely by Bourbon; Nacional, Amarelo de Botucatu and Maragogipe were the least productive.

1050. MONTEALEGRE, M. R.

El café nacional de El Salvador y su introducción a Costa Rica. (The national coffee of El Salvador and its introduction into Costa Rica.)

*Suelo Tico*, 1949, 2: 279-82.

As early as 1920, seed of coffee obtained from El Salvador and thought to be the variety Bourbon was introduced into Costa Rica. The trees yield much better than those of the *arabica* type normally grown in Costa Rica, but as the quality of Bourbon coffee was considered to be poor no further attempt was made to extend its cultivation. In 1946, however, further quality tests were made by the Central American and Mexican Coffeegrowers' Federation, in which the national coffee of El Salvador was judged to be equal to that of Costa Rica. A survey of the El Salvador plantations revealed that the national coffee was not the true Bourbon variety; it was similar to the *Coffea arabica* grown in Costa Rica but was more productive and highly resistant to American Leaf Disease (*Omphalia flavida*). Trees 30-40 years old yielded from 25-40 cwt. per manzana [about  $1\frac{1}{2}$  acres] as compared with 6-8 cwt. produced by the Costa Rican variety. Seed was again introduced and many nurseries have been established in a campaign to replace old, unproductive trees of Costa Rican coffee with trees of the national El Salvador variety.

1051. FERNIE, L. M.

The preparation of nursery beds and the sowing of coffee seed.

*E. Afr. agric. J.*, 1950, 16: 56-7.

Beds should be 4 ft. wide, 24-30 ft. long, with 3 ft. paths between, and sited on a deep well-drained loam in a sheltered position. The seed should be sown flat side downwards and immediate watering, mulching and artificial shade erection is desirable. Roguing should be up to 50%. C.W.S.H.

1052. BERTONI, J.

Sistemas coletores para determinações de perdas por erosão. (Methods of determining erosion losses.) [English summary  $\frac{1}{2}$  p.]  
*Bragantia*, 1949, 9: 147-55, bibl. 4, illus.

A general description is given of the methods used for determining soil erosion and water losses from experimental plots, together with a detailed description of

a method of collecting a fraction of the total run-off, using slot divisors of the Geib type. The erosion losses occurring in one day from an experimental plot of coffee on a slope of 6.5% are indicated.

1053. SILDARRIAGA V., M.

Nuevo método de trazado de cafetales en curvas a nivel como sistema antierosivo. (A new method of contour planting for coffee to prevent erosion.)

*Agric. trop. Bogotá*, 1949, 5: 10: 29-36, illus.

A modified method of contour planting recommended for use on slopes greater than 50% is described in detail and illustrated with diagrams. It allows soil conservation practices to be applied more easily than do the square or triangular planting systems.

1054. JIMÉNEZ J., J.

Transplante de la almáciga. (Planting coffee.)

*Suelo Tico*, 1949, 2: 172-4, 377-8, 480-1.

Directions to growers on transplanting from the nursery and on care of new plantations, including notes on shade, windbreaks, soil conservation, pruning, and control of weeds, pests and diseases.

1055. FRANCO, C. M.

O problema do sombreamento dos cafezais em São Paulo. (The problem of shade trees in coffee plantations in São Paulo [Brazil].) [English summary 7 lines.]

*Bol. Super. Serv. Café, S. Paulo*, 1947, 22: 708-17, bibl. 5 [received 1950].

In a study of the soil water conditions in shaded and unshaded coffee plantations in the state of São Paulo, it was found that in many cases there was competition for water between the coffee trees and the shade trees. It is concluded that shading is not advisable in all areas of the state, and that further research is needed to determine the soil and climatic conditions under which it may be used successfully.

1056. ALMEIDA, C. R. MARQUES DE.

O efeito das plantas de sombra nas culturas tropicais. (The effect of shade trees in tropical plantations.) [French summary  $\frac{1}{2}$  p.]

*An. Inst. sup. Agron. Lisbon*, 1948-49, 16: 91-9, bibl. 4.

A study of the soil profiles of coffee plantations on the island of S. Tomé showed that, where shade trees were grown, the surface soil and that at a depth of 0.9-1.8 m. was neutral in reaction, whereas where shade trees were not grown the surface soil was strongly acid (pH 4.5). This is thought to be due to the fact that the deeply-penetrating root systems of the trees help to prevent leaching.

1057. FRANCO, C. M., AND INFORZATO, R.

O sistema radicular do caféiro. (The root system of coffee trees.) [English summary  $\frac{1}{2}$  p.]

*Bol. Super. Serv. Café, S. Paulo*, 1947, 22: 480-97, bibl. 10, illus. [received 1950].

A new method for studying the root system of coffee trees is described. A trench 30 cm. wide is excavated along the side of a row of trees, 15 cm. from the stems. The soil is removed in 30 cm. square blocks varying in



thickness according to the depth at which they are situated, those from the first 3 layers being 10 cm. thick, those from the next 2 layers 20 cm. thick, and those from the remaining layers 30 cm. thick. The roots from each block are then washed, dried and weighed, and an excavation map is drawn from the data obtained. A more accurate idea of the root distribution can be obtained by spreading out the roots removed from each block of soil on an excavation map drawn to scale. Examples of such maps are reproduced. The best root distribution was found in "mixed" terra rossa soil in Campinas county, where the roots extended to a depth of more than 2.5 m. The poorest root distribution was found in "true" terra rossa soil in Ribeirão Preto county, where the roots were mostly confined to the surface layers.

1058. INFORZATO, R.

Subsidios para o estudo da adubação verde dos cafezais. I. Estudo do sistema radicular de *Tephrosia candida* D.C. II. Estudo do sistema radicular do feijão guandú. (Green manuring of coffee. I. A study of the root system of *Tephrosia candida*. II. A study of the root system of *Cajanus cajan*.) [English summaries 5 lines each.] *Bol. Super. Serv. Café, S. Paulo*, 1947, 22: 703-7, bibl. 7, illus., and 764-6, bibl. 4, illus. [received 1950].

Using the method of excavation described in previous papers [see H.A., 18: 2961 and abstract above], the authors studied the root distribution of *Tephrosia candida* and *Cajanus cajan* in coffee plantations on "mixed" terra rossa soil in Campinas county, Brazil. The roots of the former extended to a depth of more than 3.85 m., 99.14% by weight being located in the top 0.5 m. of soil. The roots of the latter extended to a depth of more than 2.95 m., 90.67% by weight being located in the top 0.3 m. of soil.

1059. CHAPARRO GONZÁLEZ, A.

Abonamiento racional del café. (Rational fertilizer practices for coffee.)

*Agric. trop. Bogota*, 1949, 5: 6: 23-9, illus.

Concise directions to Colombian coffee growers concerning fertilizer practices.

1060. LIZANO, F.

Apuntes sobre el sistema de riego por aspersión. (Notes on the sprinkler system of irrigation [for coffee].)

*Suelo Tico*, 1950, 4: 49-54, illus.

The 2 systems of sprinkler irrigation that have been developed in the United States for use on fruit and vegetable crops are described. The low pressure perforated tube system is suitable only for use on level ground and is not recommended for coffee plantations. The rotating jet system, however, worked by a pump and motor and requiring pressures of 15-100 lb. per sq. inch, is considered very suitable for use on coffee as it can be used on sloping ground, minimizes the danger of erosion, and, compared with furrow irrigation, is economical of labour and water. The manipulation of a demonstration installation in a small coffee plantation is described. The frequency and amounts of applications depend on the type of soil, but it has

been suggested that the first irrigation should be given from 1 February to 15 March. This can be followed by another application if there is no rain. The question of costs is discussed, and it is estimated that the equipment will pay for itself within 5 years.

1061. CARVALHO, A., AND KRUG, C. A.

Agentes de polinização da flor do caféiro (*Coffea arabica* L.). (Pollinating agents of *Coffea arabica*.) [English summary 3 p.] *Bragantia*, 1949, 9: 11-24, bibl. 8, illus.

An account is given of the methods used and results obtained in a study carried out at the Instituto Agrônômico, Campinas, to determine the relative importance of various agents in the pollination of coffee flowers. It was found that the importance of gravity, wind and insects may vary appreciably as a result of local environmental conditions. Certain definite trends, however, were observed. Average natural fertilization was estimated at 62%. When the influence of wind, gravity and insects was excluded, 24% fertilization occurred. With the combined agency of wind, gravity and insects, 18.5-32.7% fertilization occurred as a result of self-pollination and 4.1-5.2% as a result of cross-pollination. In all cases except one, the percentage fertilization resulting from self-pollination was higher than that from cross-pollination. With self-pollination, wind and insects are of about equal importance, the effect of gravity being relatively less, and likely to be variable. With cross-pollination, wind plays the most important part.

1062. MENDES, C. H. T.

Introdução ao estudo da auto-esterilidade no gênero *Coffea*. (An introduction to the study of self-sterility in the genus *Coffea*.) [English summary 1 p.]

*Bragantia*, 1949, 9: 35-41, bibl. 7.

The results are presented of cytological and genetical studies carried out at the Instituto Agrônômico, Campinas, to determine the degree and causes of self-sterility in the species *C. canephora*. Although the formation of the embryo-sac and pollen grains was found to be normal, and on artificial media the pollen showed 55% germination, in self-pollination tests a high degree of self-sterility was observed. This was related to poor germination of the pollen and limited development of the pollen tubes.

1063. ELGUETA, M.

Algunos resultados de experimentos de podas de cafetales. (Some results of pruning experiments with coffee.)

*Suelo Tico*, 1950, 4: 36-9.

At the Interamerican Institute of Agricultural Sciences, Turrialba, an experiment was carried out to compare the effect on yield of annual pruning with that of no pruning on established coffee plantations under various conditions of shade. The experiment was only continued for 2 years, but in both years the unpruned plots yielded more heavily than the pruned ones in all cases. Cutting back the leaves of transplanted seedlings was also found to retard growth considerably. A trial carried out by the National Federation of coffee growers in Colombia is also reported, in which the effects of formation pruning of young trees was studied. The method practised in Costa Rica, of

severe initial pruning to produce a tree with a multiple stem, seriously delayed cropping in the early years. The less severe Colombian method, which produces a single-stemmed tree with a dense, umbrella-shaped head, resulted in yields 5 times as heavy during the first 5 years of growth, although the trees were often unshapely and difficult to manage. It is concluded that a system of formation pruning is required which will induce branching without delaying cropping, and that the pruning of mature trees should be limited to the cutting-out of dead wood.

1064. DUFOURNET, R.

Le caféier d'Arabie dans le nord de Madagascar et l'*Hemileia vastatrix*. (*Coffea arabica* culture in North Madagascar and *Hemileia vastatrix*.)

*Agron. trop.*, 1950, 5: 297-303, illus.

Losses in coffee yield due to *Hemileia vastatrix* are estimated to be about 75% in the Béalanana region of North Madagascar and in addition the quality of the beans harvested is seriously affected. Experiments [details not specified] have shown that the disease can be kept under control by 3 applications per year of the following spray mixture: 1.5 kg. copper sulphate, 2.3 kg. lime, 1 l. skimmed milk and 100 l. water, each tree receiving about 20 l. per application. The uredospores of *Hemileia* are parasitized by *Verticillium hemileiae*, but there is not much hope of successful biological control.

1065. LEPAGE, H. S., AND GIANNOTTI, O.

Atividade de alguns inseticidas modernos sobre a broca do café—"Hypothenemus hampei (Ferrari)". (The action of some modern insecticides against the coffee borer, *Hypothenemus hampei* (Ferrari).) [English summary  $\frac{3}{4}$  p.]

*Arg. Inst. biol. S. Paulo*, 1949-50, 19: 299-308, bibl. 9, illus.

In laboratory tests at the Biological Institute, São Paulo, 5 insecticides showed equal toxicity against the coffee borer at the following concentrations: BHC at 0.5%, thiophosphate at 0.5%, DDT at 5%, chlordane at 10% and chlorinated camphene at 20%. In the field 1% BHC gave much better control than 10% chlordane, 10% DDT or 0.5% thiophosphate+5% DDT. Thiophosphate alone gave no control of the coffee borer in the field. It is suggested that the effectiveness of BHC in the field may be due to a repellent action. This possibility is now being investigated.

1066. SPEER, M.

Observações relativas à biologia do "bicho mineiro das folhas do caféiro", *Perileucoptera coffeella* (Guérin-Méneville) (Lepidoptera-Buccolatricidae). (Observations on the biology of the coffee leaf miner, *Perileucoptera coffeella* Guérin-Méneville (Lepidoptera-Buccolatricidae).) [English summary 1 $\frac{1}{2}$  pp.]

*Arg. Inst. biol. S. Paulo*, 1949-50, 19: 31-47, bibl. 4.

These observations on the life cycle of the coffee leaf miner were made at São Paulo in Brazil. There are 7 generations in a year, and development continues

slowly during the cold season. The preference of the pest for certain varieties of coffee seems to be determined by the texture of the leaves. Owing to their relatively tender leaves, varieties of *Coffea arabica* are much attacked, especially the National and Maragogipe varieties.

1067. DE MEDINA, A. R.

A tecnologia do café e o tamanho da propriedade. (The preparation of coffee in relation to size of holding.) [English and French summaries  $\frac{1}{2}$  p. each.]

*Agron. angol.*, 1950, 3: 3-16.

The author describes the process of preparing coffee for market as it is carried out in Angola. In some cases, particularly on the large estates, coffee is prepared on the estate itself, but generally the crop is sent to a factory. Although the preparation can be done more efficiently and cheaply in a factory, the cost of transport is high. A study was made of the economics of preparation on estates of various sizes, and it is concluded that more co-operative factories are needed near the areas of production. For smaller farms, producing less than 50 tons a year, it would be more economical to send the cherry to a factory up to 78 km. away than to prepare it on the estate. For a medium-sized estate the economic limit for transport is 48 km., and for a large estate, producing 300-500 tons, 3 km.

*Hard fibres.*

(See also 1229, 1240.)

1068. MEDINA, J. C.

A experimentação do sisal. Parte I. Experiências de espaçamento. (Sisal investigations. I. Spacing trials.) [English summary 1 p.]

*Bragantia*, 1948, 8: 91-108, bibl. 14 [received 1950].

The following results were obtained from spacing trials carried out at the Ribeirão Preto and Pindorama Experiment Stations of the Instituto Agrônomo, Campinas. The length of the life cycle of most of the sisal plants varied from 5 to 8 years, and showed a close correlation with planting distance. The wider the spacing the earlier the plants started to pole. Poling generally occurred during the period January-March. The greater the density of the plants, the greater the leaf production per unit area. With the cutting method practised (i.e. cutting yearly only those leaves at an angle greater than 45° from the axis), narrow spacing between the rows was found to hamper cultivation excessively. A 2×2 m. spacing was unsatisfactory, as it gave a low plant density but prevented ingress from any direction. Spacing 2.4 or 3 m. between the rows and 1.2 m. in the rows is recommended.

1069. NORTH-COOMBES, G. A.

La nouvelle défibreuse Humbert. (A new fibre scraper machine.)

*Rev. agric. Maurice*, 1950, 29: 107-11, illus.

The Humbert model has been developed for scraping *Furcraea* leaves efficiently. It is hoped that a satisfactory mechanization of this process will help to establish the *Furcraea* fibre industry in Mauritius.



The diagrammatic drawings and the adjustment of the machine are explained in English (1 page).

### Mangoes.

(See also 651, 932, 933, 1019, 1194, 1203, 1222.)

1070. NAIK, K. C.

Improvement of the mango, *Mangifera indica* L., by selection and hybridization. *Indian J. agric. Sci.*, 1948, 18: 35-41, bibl. 10, illus. [received 1950].

Although chance seedlings have given rise to some of the best mango varieties in the world, very little has yet come of attempts to produce high quality new varieties by hybridization. At Kodur, where controlled pollination was started in 1940, only 88  $F_1$  progeny have been raised from 7,308 pollinations. In 1946, 6 of these 88 produced fruit for the first time, and 3 of these are promising and are described in detail. Chance seedlings mostly of known parentage have also been planted. Out of 25 bearing seedling trees of known monoembryonic parents, 6 are promising and these, too, are described in detail. In discussing polyembryony the writer points out that when a monoembryonic mango is crossed with one which is polyembryonic, then the progeny is polyembryonic in every case. C.W.S.H.

1071. COBIN, M.

Mango selection, propagation and culture. *A.R. Fla agric. Exp. Stat. for 1948/49*, pp. 262-4.

Frost on 1-2 January caused the death of many young grafted and seedling trees. Among the former no clear difference in resistance to freezing was seen in 5 rootstocks. Preliminary tests with growth regulatory substances have not so far induced flower formation. In a urea spray test Nugreen was applied in February and April to Haden mango trees at concentrations of 5, 10, or 20 lb. per 100 gal. water, each tree receiving 4 applications. Leaf analyses suggest that some absorption of N resulted from the 20-lb. solution, but the increase was not significant over the N content of check trees; this concentration also caused some tip burn of young foliage, but not of mature leaves. Observations in the nursery showed seedlings of Turpentine, Haden and Saigon to average 3 to 5 ft. in height at 10 months, whereas No. 11 seedlings averaged  $1\frac{1}{2}$  to  $2\frac{1}{2}$  ft.; with the first three varieties fixed copper spray applications once a week gave almost complete control of mango scab, but with No. 11 this treatment was inadequate.

1072. NAIK, K. C.

Vegetative propagational methods and their relation to tree performance in the mango, *Mangifera indica* L. *Indian J. agric. Sci.*, 1948, 18: 147-56, bibl. 2 [received 1950].

Trials, planted in 1939-40 and harvested during the 3 years 1944-46 were laid down to (1) compare inarching, root grafting and double working of the Neelum and Bangalora varieties, (2) test the effect of Neelum variety when used as the intermediate stem piece in the double-working of three shy-bearing varieties, and

(3) determine the effect of inarching Neelum using seedlings of  $10\frac{1}{2}$ ,  $13\frac{1}{2}$  and  $16\frac{1}{2}$  months old. Bangalora was found to be more vigorous and more prolific than Neelum. There were no differences between the propagation methods except that Bangalora inarched plants were higher yielding than double-worked plants. Double-working had a generally stunting effect and promoted earlier flowering, but the layout did not permit exact comparisons to be made. Of the three scion varieties used, Himayuddin and Alampur Baneshan cropped more heavily than Jehangir. In trial (3) there was no significant difference between the performance of the different aged rootstocks. One-year-old seedlings are considered to be the best. Information is given on the compatibility of the varieties used in these trials based on the relative growth of stocks, scions and intermediates. In his discussion the author suggests that extended trials of this nature should provide a guide to topworking the many hundreds of poor varieties to be found in South India. C.W.S.H.

1073. AGÜERO S., D.

Injerto en mangos. (Grafting mangoes.) *Suelo Tico*, 1949, 3: 128-34, illus.

The techniques of spliced approach, tongued approach, crown, and whip and tongue grafting, T budding and patch budding, all of which have been used successfully on mangoes, are described and clearly illustrated.

1074. GANDHI, S. R.

Effect of buttress grafting on growth and development of orchard trees. *Poona agric. Coll. Mag.*, 1950, 41: 1: 23-44, illus.

A description is given of inarching young seedling rootstocks on to the trunk and main branches of older trees with special reference to mangoes. This buttressing is a useful means of rejuvenating large sickly trees the main trunks of which have become diseased or damaged. It is pointed out, however, that, contrary to popular belief, healthy trees are not in any way invigorated by inarching with other rootstocks. The inarch should be applied to the scion and not to the stock of the tree to be buttressed. An inarch applied to the stock only provides an additional competitive root system, but when applied to the scion it gradually takes the place of the old root system which makes no further growth. Buttressing by inarching to the main branches results in the division of the tree into several connected but independent parts which will develop differently. C.W.S.H.

1075. SODHI, G. S., AND BATRA, A. L.

Use of power-driven sprayer in the control of mango hopper in the Punjab. *Indian Fmg*, 1950, 11: 158-61, illus.

The mango hopper (*Idiocerus* sp.) was effectively controlled in the eastern Punjab with a single spray of 0.15% DDT (Gesarol 550). In earlier trials it was found impossible to spray entire trees reaching 40 to 50 ft. in height with any hand-worked spraying machine. A power-sprayer used in May, 1948, against the adults and in April, 1949, against the nymphs gave satisfactory results, and a very considerable yield increase resulted from the control of the hopper.

1076. GOVINDARAJAN, V. S., AND SREENIVASAYA, M.  
A papyrographic study of the nonprotein nitrogen of mangoes (*Mangifera indica* Linn.).

*Curr. Sci.*, 1950, 19: 234-6, bibl. 6, illus.

The non-protein nitrogen fraction was determined by partition chromatography for the fruit pulp of 4 mango varieties, Malgova, Raspuri, Alfonso, and a local seedling variety. The chromatograms are shown diagrammatically and discussed. In general the principal amino acids found were aspartic and glutamic acids, alanine and a near-tyrosine spot, with glycine, methionine and leucines as minor constituents, but differences in proportions occurred between the four varieties.

1077. VERMA, G. S.

**Tip pulp of the mango fruit.**

*Curr. Sci.*, 1950, 19: 246, bibl. 1.

In the United Provinces losses of 25% occur in fruits of the varieties Safeda, Maldaha, Bambai and Lucknow, due to the tips of the fruit becoming prematurely pulpy and turning dark brown. Culture studies did not reveal the presence of an organism, nor did healthy mangoes inoculated with affected pulp develop the disorder.

**Oil palms.**

(See also 1187a, e, p, 1211, 1237.)

1078. DE POERCK, R. A.

Contributions à l'étude du palmier à huile africain (*Elaeis guineensis* Jacq.). (Contributions to the study of the African oil palm.)

*Oléagineux*, 1950, 5: 623-8, bibl. 20, illus.

The author summarizes the results of his botanical studies at the Institut pour l'étude agronomique du Congo Belge, Yangambi, on the development of the gynaecium in the flower of *Elaeis guineensis* and on the growth of the fruit.

1079. GOGOI, T.

Observations on strains of *Fusarium oxysporum* from the oil palm and banana from Central and West Africa.

*Trans. Brit. mycol. Soc.*, 1950, 33: 121-31, bibl. 17, illus.

A study of strains of *Fusarium oxysporum* isolated from necrosed vascular strands of the oil palm (*Elaeis guineensis*) from West and Central Africa and from bananas infected with wilt disease in the Cameroons.—Department of Cryptogamic Botany, Manchester University.

1080. KEHREN, L.

L'extraction de l'huile de palme par la vapeur saturée. Relation entre l'extraction et certains caractères physico-chimiques du péricarpe du fruit de palme. (The extraction of palm oil by saturated vapour. The relationship between extraction and certain physico-chemical characteristics of the pericarp.)

*Oléagineux*, 1950, 5: 563-8, bibl. 11, illus.

The structure of the pericarp is described and its chemical composition tabulated. The dominant role

played by pectic compounds in the process of extraction is stressed. A static process of extraction by saturated vapour is described which has given good results on a laboratory and small industrial scale. Between 50% and 60% of the oil is obtained in a pure state in 45 minutes, and the extraction of the remaining oil by pressure is facilitated by the pasty consistency of the residue. Further studies with larger apparatus are in progress.

1081. SPOON, W., AND SESSELER, W. M.

Onderzoek van vethoudende palmvruchten uit Suriname. (A study of fat-containing palm fruits from Surinam.) [English summary 2 pp.]

Reprinted from *Oliën, Vetten en Oliezaden*, 1950, 34: 3: 25 and 34: 4: 41, being *Ber. Afd. trop. Prod. Kon. Ver. Ind. Inst. Amsterdam* 227, 1950, pp. 28, bibl. 15, illus.

At the Tropical Products Department of the Royal Institute for the Indies, Amsterdam, the fat content of the pericarp and kernel, and the composition and properties of the various types of fat occurring in the fruits of the following palms was studied: *Astrocaryum segregatum*, *A. paramacca*, *A. sciophilum*, *Mauritius flexuosa*, and *Maximiliana maripa*. The possible value of these fruits for industrial purposes is discussed.

**Pineapples.**

(See also 492.)

1082. PY, C.

L'ananas aux îles Hawaï. (Pineapple growing in Hawaii.)

*Fruits d'Outre Mer*, 1950, 5: 124-33, illus.

The paper is an extract from a report on the Hawaiian pineapple industry made to the Institut des Fruits et Agrumes Coloniaux de France.

**Rubber trees.**

(See also 1187g, 1218.)

1083. MILLER, H. E.

The need for research.

*Financial Times Survey of the future of natural rubber*, July 31, 1950, p. i.

The Chairman, British Rubber Producers' Research Association, gives a historical account of the development of research into the production of rubber. In 1950, £960,000 was allocated for British, French and Dutch (including Indonesian) research organizations, while in Malaya alone a 5-year research plan has been accepted involving an expenditure of some £3 million. The author concludes that "all in all, the rubber industry is an outstanding example of progressive service to mankind, and the prospects for its further expansion are limitless".

1084. MANN, C. E. T.

Improving the quality of natural rubber.

*Financial Times Survey of the future of natural rubber*, July 31, 1950, p. xi.

The Director, Rubber Research Institute of Malaya, outlines the scientific work that has been, and is being, undertaken in the countries where rubber is grown.



1085. BISWAS, K. -

**The prospects of India rubber and para rubber in India.***Indian J. agric. Sci.*, 1949, **19**: 413-34, bibl. 8, illus.

An account is given of the production of rubber from *Ficus elastica* and from *Hevea brasiliensis*. It is concluded that *Ficus elastica* has had a fair trial in India, but that it is unlikely ever to compete with hevea owing to its poor yield, slowness in coming into production, high resin content, etc. The climate of certain areas in India appears suitable for hevea, and possible areas for experimental planting are shown on a map. The market prospects for para rubber are discussed and it is concluded that great caution should be exercised before serious planting is undertaken in India. It is suggested that certain unused forest lands in south, north-east and east India might be used for growing rubber with other timber and forest plants.

C.W.S.H.

1086. TABORDA PESSANHA, M. V., AND FRAGATA JUNIOR, A. A.

**Estudos acerca da *Hevea brasiliensis* na E. A. C. (Studies on *Hevea brasiliensis* at the Central Agricultural Station, Cazengo.)**[English and French summaries  $\frac{1}{2}$  p. each.]*Agron. angol.*, 1950, **3**: 59-71.

With a view to improving the standard of rubber production in Angola, observations were made on the yield of the few available hevea trees grown at the Central Agricultural Station, Cazengo, and clonal plantations were established with the best material. The records show a negative correlation between yield and dry rubber content of the latex. The production of latex was found to increase with the frequency of tapping up to a certain limit, the limit depending on the system of tapping used.

1087. VAN HELL, W. F.

**A.V.R.O.S.' hevea-selectie in de jaren 1935-1941. (A.V.R.O.S. hevea selection during the period 1935-41.)** [English summary 4 pp.]*Arch. Rubbercult.*, 1950, **27**: 1-53, bibl. 3, being *Meded. alg. Proefst. A.V.R.O.S., Rubberserie No. 124*.

A record of the yields of legitimate and illegitimate seedling and clonal selections made at the A.V.R.O.S. experiment stations in the Dutch East Indies.

1088. DE BUY WENNIGER, W. F. M.

**Variabiliteit der individuele producties van hevea clonen. (Variability of yield within individual hevea clones.)** [English summary 5 $\frac{1}{2}$  pp.]*Arch. Rubbercult.*, 1950, **27**: 153-76, bibl. 11.

Data are tabulated on the daily yields of 134 budded trees of clone Djasinga I recorded throughout the year 1931-32 and at intervals subsequently. The "spontaneous" variability (i.e. that shown in daily records) was very great, the highest producer yielding 11 $\frac{1}{2}$  times as much as the lowest producer; the ratio of the "real" variability (i.e. that shown in average annual records), however, was only 5:1. Observations on the performance of individual trees of this clone

showed that in general high yielding trees continued to give high yields throughout their life, and low yielding trees continued to give low yields. This observation supports the conclusion that close initial planting with subsequent selective thinning is justified even with clonal material. Yield records, however, used as a basis for thinning, should be taken over a period of longer than 2 months. A system for thinning mono-clone plantations is suggested. No correlation was observed between the yield of the parent tree and that of the daughter clones.

1089. CARPENTER, J. B.

**Plant pathology in the division of rubber plant investigations.***Plant Dis. Repr.*, 1950, **Suppl. 191**, pp. 60-6, bibl. 8.

This article includes accounts of the South American leaf blight of *Hevea* (*Dothidella ulei*) and of *Pellicularia* leaf spot (*P. filamentosa*), with notes on fungicidal control and disease resistance. Following several years of study at Turrialba it is now considered feasible to produce three-component trees that are highly resistant to leaf blight, i.e. a seedling rootstock, a high-yielding stem and a disease resistant top. Fungicidal sprays are used to control the disease on the susceptible intermediate clones until they have been budded. To date no selections resistant to *Pellicularia* leaf spot have been found in *H. brasiliensis*, though some blight resistant top-working clones are quite tolerant. *H. rigidifolia* appears to be highly resistant or immune to leaf spot.

1090. ROBERTS, K. C.

**The constituents of hevea latex. Part VII. Studies of the dependence of the composition of latex on various factors operative in the plantations.***J. Rubb. Res. Inst. Malaya*, 1950, **12**: 278-90, bibl. 3, being *Commun. 270*.

The effect of certain estate factors on the fatty acid complex, phosphate complex and caoutchol content of latex was studied in 1937 and 1938 in several groups of trees. Caoutchol has since been shown to be an oxidation product of the rubber hydrocarbon and is not the constituent from which the rubber obtains its elastic properties as was thought at that time. Seasonal rhythm affected the fatty acid complex and the phosphate complex. The fatty acid complex in the latex showed maxima following the periods of refoliation and of seed formation. The phosphate complex reached its maxima in both years at the seed formation period. The caoutchol content was dependent on the rainfall, maxima being recorded during the wet seasons. The fatty acid complex and caoutchol content of 5 rubber clones differed markedly from each other and from mature seedling rubber. As far as age of trees was concerned, trees just brought into tapping showed no difference in fatty acid complex from trees 2 years older. The phosphate complex of the younger trees was higher, though this difference decreased as tapping proceeded. The caoutchol content of the younger trees was also higher. Differences in the tapping systems employed had no effect on these latex constituents.

C.W.S.H.

## 1091. VAN SCHOONNEVELDT, J. C.

Chemische samenstelling van volwassen hevea-blad uit enkele bemestingsproeven. (Chemical composition of mature hevea leaves sampled from manurial trial plots.) [English summary 4½ pp.]

*Arch. Rubbercult.*, 1950, 27: 83-105, bibl. 7.

Chemical analyses were made of leaf samples taken from 4 manurial trials with hevea on old laterite soils in the Dutch East Indies, in order to determine how far the chemical composition of the leaf may be used as an indication of the nutrient status of the tree. The results show that diagnosis of N, P or K deficiency cannot be made with any certainty on the basis of leaf composition alone.

## 1092. DE HAAN, I.

Gebrekverschijnselen bij *Hevea brasiliensis*. (Deficiency symptoms in *Hevea brasiliensis*.) [English summary 1½ pp.]

*Arch. Rubbercult.*, 1950, 27: 107-37, bibl. 7, illus.

In pot experiments the effects of K, Ca, Mg, P, S, N, and Fe deficiencies on elongation, girth increase and weight of roots, stems and leaves of hevea were studied. The results of analyses of mature leaves and stems of the plants used in these experiments are tabulated and discussed. The amounts of N, P, and K that can be lost to the soil when an old plantation is cleared are calculated. Finally, the visible symptoms of nutrient deficiencies in hevea are described and ways of determining these deficiencies in the field discussed.

## 1093. COOK, J.

The purchase and bulk-processing of small-holding latex.

*Malay. agric. J.*, 1950, 33: 136-43.

The organization of buying units for latex in the State of Kedah is described. Six such units are now in operation with daily turnovers, in terms of dry rubber content, varying from 130 to 500 lb. The scheme has resulted in higher profits for the smallholder-producer and in the production of a higher quality rubber in areas where low grade rubber production had been the rule.

C.W.S.H.

## 1094. VAN GILS, G. E.

A method to accelerate the creaming process of hevea latex.

*Arch. Rubbercult.*, 1950, 27: 139-51, bibl. 2, illus., being *Commun. Stichting Ind. Inst. Rubberonderz. Bogor* 77.

Experiments are described, showing that the introduction of slanting partitions into the creaming vessel accelerates the creaming process. An explanation of the phenomenon is given based on the observation that the partitions enable the cream and serum to flow upwards and downwards respectively along different ways. Attention is drawn to analogous phenomena, namely: 1. Creaming in tubes placed in slanting position. 2. The centrifuging of latex in a separator. 3. Centrifuging in an angle-centrifuge. 4. Sedimentation in tilted vessels. [Author's summary.]

*Sugar cane.*

(See also 443, 493-499, 1187h, j, l, n, o, q, r, u.)

## 1095. HONIG, P.

Developments in cane sugar production since 1938.

*Sugar*, New York, 1950, 45: 9: 23-4, 37.

A slightly condensed version is given of an address delivered by the Chairman of the International Society of Sugar Cane Technologists at the 7th Congress, in Brisbane, Australia, on 11 September, 1950. Among the points discussed briefly are production trends in different parts of the world, the tendency with sugar cane, but not with sugar beet, for improvements to be based on increased crop yields rather than on higher sugar percentages, the increased use of "wild" species in crosses with "noble" canes to promote disease resistance, and developments in the field of plant physiology. Attention is drawn to the great discrepancy between knowledge and its application, and to the lack of information relating to the human labour involved in different types of cane farming; figures are quoted from Hawaii and Java to show how wide the difference can be. Changes in methods of transport and factory processes, and the development of by-products are also mentioned.

## 1096. TURNER, P. E.

Researches on sugar-cane agriculture in the British West Indies and British Guiana, 1949.

[Publ.] B.W.I. Sugar Ass., 1950, pp. 32.

Variety trials and cultural and manurial experiments in the British West Indies are described. Arrangements have been made for the testing of seedling canes for mosaic disease resistance in Jamaica. Varieties bred in Barbados now cover practically all the sugar cane growing areas. Varieties recommended are: Trinidad, B.3337, particularly for poorer soils; Barbados, B.41211, B.41227 partly to replace B.37161, B.4098; St. Kitts, B.34104 (high rainfall), B.41211; Antigua, B.4098; British Guiana, B.34104, B.41227. Soils have been classified into four groups according to their tillage and drainage requirements. Field to field surveys are being carried out on the basis of this classification and recommendations for management and sequence of operations can be given accordingly. Comparisons are being made in several colonies of different methods of bed construction. In particular the "Woodford Lodge" system of 24 ft. cambered beds and the "Louisiana" system of 6 ft. beds are being compared with local practices. The former system is proving very satisfactory and is particularly suited to mechanical cultivation. Trials are being carried out to find the optimum spacing for maximum yield and the most suitable row spacing for mechanical tillage. Optimum spacing has varied with soil, rainfall, etc. In the manurial experiments high N and P dressings have not shown any appreciable responses; pen manure trenched has been more effective than broadcast; dunder has proved a good source of potash.

C.W.S.H.

## 1097. PINEDA P., M. A.

Cómo se cultiva la caña de azúcar en la costa sur de Guatemala. (The culture of sugar cane on the south coast of Guatemala.) *Alman. agric. Guatemala*, 1949, 1: 154-71.



An account of the main varieties grown, the climate and soils of the district, and the methods of cultivation practised.

1098. HES, J. W.

Java-bijdragen tot de physiologie van het suikerriet. (Contributions from Java on the physiology of sugar cane.) *Chron. Nat.*, 1950, 106: 285-8, bibl. numerous.

A review of the physiological investigations that have been carried out at the Research Station of the Java Sugar Industry since its establishment in 1887.

1099. (SOLOMON, S. E.)

Queensland sugar production: Government Statistician's report on the 1948 season. *Aust. Sugar J.*, 1950, 41: 615-21.

Figures are tabulated, collectively or by divisions, for numbers of growers, and for acreages and yields of both cane and sugar per acre. Areas cut for plants and fodder are also indicated. Some details connected with the manufacture and disposal of molasses are given.

1100. ROWLEY, M. W.

Sugar bibliography.

[Mimeo. Publ.] Univ. Cape Town, Library School, 1947, pp. 19 [received 1950].

Following a list of periodicals, this bibliography is divided into sections on general information, cultivation, the sugar industry in different countries, including production, economic aspects and by-products, manufacturing and refining, machinery, diseases and chemistry. Some 190 references are given, many being from South African sources. The bibliography is clearly by no means exhaustive, but may be a useful adjunct to other sources of information.

1101. FRONTOU, G.

Travaux sur la culture de la canne à sucre au Viet-Nam. (Sugar cane experiments in Viet-Nam.)

*Agron. trop.*, 1950, 5: 115-37, bibl. 5, illus.

In 1935 sugar cane trials were begun in Viet-Nam in several places and carried on for a few years. The recommendations made at their provisional conclusion were then put into practice by the growers, with the result that sugar yields from the same acreage had risen substantially by 1945. This advance is almost exclusively due to the introduction of a few foreign varieties, notably Co.290, which replaced the traditional "mia lau", a variety of *Saccharum sinense*. Experimental data presented here show that yields could be further increased by the application of fertilizer in addition to the manure commonly used and by irrigation. An account is also given of the climate and soil conditions of the country and of the [fairly primitive] local methods of growing sugar cane.

1102. ARRUDA, S. C., AND ARRUDA, H. C.

Comportamento e produção da muda sã da variedade Co.290, no estado de S. Paulo. (The behaviour and production of selected seed-cane of the variety Co.290 in the state of S. Paulo [Brazil].) [English summary 1½ p.]

*Arq. Inst. biol. S. Paulo*, 1949-50, 19: 175-201, bibl. 7.

Mosaic-free selected seed cane of the variety Co.290 gave higher yields in tons of cane per hectare than infected seed cane, although there was no difference in the amount of sugar produced per ton of cane. This increase in weight in the plant crop was greater in the absence than in the presence of fertilizers, and was due, in the absence of fertilizers, to more and heavier stalks, and in the presence of fertilizers to heavier stalks only. The first ratoon crop, however, also produced more stalks in the presence of fertilizers. It is considered that, under good soil conditions, the greater tonnage of selected seed cane is due mainly to earlier tillering and to the consequent greater uniformity of the stools. Application of fertilizers increased the spread of mosaic by secondary infection, especially in ratoon cane. Secondary infection in ratoon cane was also increased by postponing harvesting until November. The difference in total production over the 2 years between selected and unselected cane in the presence of fertilizers decreased progressively as harvesting was postponed from June to November.

1103. INNISS, B. DEL.

The breeding policy adopted at the B.W.I. Central Sugar Cane Breeding Station and its practical results to date.

*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 28-33.

Following an outline of breeding policy, the parentage, main growth characters and responses to mosaic are described for B.3337, B.34104, B.35187, B.37161, B.37172, B.4098, B.41211, B.41227, B.4362, B.43337, B.43391 and B.44341.

1104. STEVENSON, G. C.

Report on the sugarcane variety situation in Trinidad.

*Bull. B.W.I. centr. Sugar Cane Breed. Stat.* 31, 1950, pp. 10, bibl. 4.

Improved methods of cultivation, including deep cultivation and the construction of cambered beds, together with the use of suitable manures, have eliminated the need for growing low-grade varieties of the Uba type. The choice of varieties for Trinidad will be governed by consideration of length of growing season, soil management and the incidence of pests and diseases. The frog hopper seems likely to be controlled by nymphal dusting, but varietal resistance should still be sought for. B.37161 has proved susceptible to the borer *Diatraea saccharalis*, but it is suggested that the attack might be reduced by hand trashing this cane at weeding time. B.34104 and B.3337 are now the most widely grown canes. The latter has taken second place in 1950 after being first in 1949. The drop in acreage has been due to its poor juice quality. B.37161 is growing in popularity, while B.4098 has been useful for late plantings. B.41227 is the most promising new variety and outyielded B.3337, B.37161 and B.37172 in a recent trial. It is stated that no comprehensive variety testing programme has been in operation for some years, and it is recommended that (1) a "variety sorting trial" be laid down for a large number of varieties to be tested, and that this be followed by (2) variety trials to be carried out on estates with the 5 or 6 most promising varieties from the "sorting trial". C.W.S.H.

1105. RODRÍGUEZ CABRERA, M.  
**Outline of the work done by the Sugar Cane Experiment Station of the Cuban Department of Agriculture.**  
*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 75-84.

The work of the station has been largely concerned with the breeding, selection and raising of new cane seedlings. Manurial and spacing experiments have been started.

1106. GONZALEZ RIOS, P.  
**Outstanding sugar cane seedlings developed in Puerto Rico.**  
*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 115-19.

Sugar cane breeding in Puerto Rico has been carried out at two experiment stations, Mayaguez and Rio Piedras (under the University of Puerto Rico), the varieties produced at each being indicated by the prefixes M. and P.R. The following promising varieties are described and their parentage indicated: M.275, M.317, M.336, P.R.902, P.R.905, P.R.907 and P.R.908. The performance of these is indicated for 18 trials, in which they are being compared with imported varieties, C.A. seedlings (Co.281  $\times$  P.O.J.2878) raised by Central Aguirre, and the standard commercial varieties B.H.10(12) and P.O.J.2878.

1107. RIOLLANO, A.  
**Rendimiento de las nuevas variedades de caña de azúcar en Puerto Rico. (Yields of new varieties of sugar cane in Puerto Rico.)**  
*Suelo Tico*, 1950, 4: 148-50.

The results of recent trials with new varieties of sugar cane bred at the Agricultural Experiment Station, Puerto Rico, are summarized. The best yielding varieties were M.336, P.R.902, P.R.905, P.R.907, and P.R.908.

1108. KING, N. J.  
**Varietal trials—1949 season.**  
*Cane Gr. quart. Bull.*, 1950, 13: 135-53.

The results of a number of variety trials in Queensland in 1949 were published in *Ibid.*, 1950, 13: 123-31; *H.A.*, 20: 2046. This paper tabulates and discusses the results of an additional 35 trials involving many varieties in different combinations. Yields of cane and either % C.C.S. in cane or total tons sugar per acre are stated in every case, and in those trials involving first ratoons the performance of both plant and ratoon crops is shown. Amongst the latter the leading varieties were Q.50, C.P.29/116, Trojan, Q.45, E.129, D.60 and Vesta, but there were marked differences between the various districts. In most trials in the Mackay district Q.50 continued to maintain its superiority, while the same applied to C.P.29/116 on the drier red soils in the Bundaberg district.

1109. LAURITZEN, J. I., AND SARTORIS, G. B.  
**Relative resistance of parent and progeny varieties of *Saccharum*, *Erianthus*, and *Sorghum* to inversion of sucrose in the southern United States.**  
*Tech. Bull. U.S. Dep. Agric.* 1006, 1950, pp. 25, bibl. 18.

The noble canes (*Saccharum officinarum*) studied are, as a group, resistant to inversion of sucrose. Progenies

from intercrossing or selfing of these varieties are also resistant. B.H.10/12, E.K.28, D.1135, and Fiji show slightly greater susceptibility to inversion than the other noble canes. The one variety of *S. robustum* studied, 28 N.G.219-A (Imp. 976), was found to be fairly susceptible to inversion of sucrose. The varieties of *S. spontaneum*, *S. barberi*, *S. sinense*, and *Erianthus arundinaceus* studied are highly susceptible to inversion of sucrose. In varieties of these six species, the initial amount of sucrose in the juice at maturity varied widely, but this proved not to be a factor in the subsequent amount (rate) of sucrose inversion. The  $F_1$  hybrids studied, *S. officinarum*  $\times$  *S. spontaneum* and *S. officinarum*  $\times$  *S. barberi*, are highly susceptible to inversion. The hybrids of varying degrees of nobilization are predominantly susceptible to inversion. Some crosses produce more resistant varieties than others. The  $F_1$  hybrids of *S. officinarum* (Crystalina and Louisiana Purple) and of P.O.J.2725  $\times$  *S. robustum* (28 N.G.251) were found to be fairly resistant to inversion. Nothing is known of the resistance of the particular variety of *S. robustum* used in these crosses, but the other parents are highly resistant. Five varieties from Co.281  $\times$  *S. robustum* (28 N.G.251) were found to vary from being almost as resistant as Co.281 to fairly susceptible. The results of these experiments have been useful in the breeding programme at Canal Point, Fla. [Authors' summary.]

1110. SINGH, S. B., AND KRISHAN, R.  
**The time of planting sugarcane in relation to varieties and manuring.**  
*Indian J. agric. Sci.*, 1948, 18: 123-8 [received 1950].

In the plains of the United Provinces planting too early results in poor germination. Late planting results in quick germination but poor establishment of the crop, with consequent poor tillering. A series of experiments was conducted between 1935 and 1946 to follow the effect on certain varieties of planting on various dates between November and April. Planting too early was not found to be so deleterious as planting too late. Low germination in early planting was partly compensated for by increased tillering. Some varieties, notably Co.312, Co.421 and Co.331, are not so badly affected by late planting as others. Therefore, if planting has to be spaced over a long period the less affected varieties should be planted later. Furthermore, some varieties, notably Co.331, maintain their responses to nitrogen even when planted late, while others show a marked falling-off in response.

C.W.S.H.

1111. CHANG, H.  
**Influence of planting date on yield and other characteristics of some early maturing cane varieties grown in South Taiwan.** [Chinese, English summary 1½ pp.]  
*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 99-124, bibl. 19.

Eleven varieties were planted in August, September and October. September planting gave the highest average yield, although the highest germination percentage was found in August. Single stalks were heaviest from September planting. No differences between planting times were found in the number of



stalks, but, in the various comparisons, number of stalks was found to be a more important factor in yield than weight per stalk. Big varietal differences were found in sugar percentage, the number of dead stalks and yield. The highest yielders in descending order were F.110, F.122 and F.134. F.110 and F.134 also ratoon well and F.134 has a high sugar percentage. C.W.S.H.

1112. CHU, T. L., SHIH, S. C., AND CHAO, T. K.  
A study of the root and shoot development of some Taiwan sugarcane varieties with a comparison of their T/R ratio. [Chinese, English summary 1½ pp.]  
*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 85-98, bibl. 5.

The germination and root and shoot development of sets of 12 varieties were recorded. Although the varieties showed markedly different germination percentages and differences in height at 40 and 120 days, no distinct differences were found in the number of roots. After 80 and 120 days there were significant differences between the varieties in weight of dry roots. No correlation was found between weight of roots and tops, and it was concluded that a heavy tonnage does not necessarily follow a strong growth of roots. C.W.S.H.

1113. CHU, T. L., AND SHIH, S. C.  
Studies on variations of some important characters in first year seedlings of sugar cane. (II).—[Chinese, English summary 2 pp.]  
*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 73-84, bibl. 8.

The first year seedlings produced by 14 crosses were recorded for number, length and width of leaves, hardness and sponginess of stalk, stalk measurements, tillering and arrowing. Width of leaf was correlated with thickness of stalk, but no other correlations between characters were found. It was concluded that P.O.J.2878 and 2725, F.23, 46, 47, 122 and 123, F.P.190, and C.P.27-139 are good parents for breeding commercial canes. C.W.S.H.

1114. CHENG, C. F., AND CHAO, T. K.  
A study of tillering period with its relation to yield in sugarcane plants. Part I. Spring planting section.—[Chinese, English summary 2 pp.]  
*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 59-72, bibl. 6.

Tillers produced by 100 random plants of F.108 and of F.134 spring-planted sugar cane were recorded. F.134 tillered more than F.108. Mortality was 64.4% for F.108 and 66.2% for F.134, and less than 25% of the total tillers developed to produce millable canes. May was the main tillering month, most tillers appeared before June, and very few after August. The mortality rate was highest in the period 15 July to 15 August and was mainly due to borers. More early tillers survived than late tillers, as they had a better chance of surviving borer damage. These early tillers also produced longer and heavier canes and a higher sugar percentage. Cultural methods which induce early tillering are therefore considered to be desirable. C.W.S.H.

1115. WANG, S. C., AND HSU, K. H.  
Application of electrical conductivity measurement to the investigation of Taiwan saline sugarcane soils. [Chinese, English summary 2 pp.]  
*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 147-68, bibl. 22.

A method of determining soluble salt content by using a resistance meter is described. The total soluble solid content of soils, if below 1%, gives a linear relationship with specific conductance, and can therefore be calculated. Cane grown in pots perished if the total soluble solid content was more than 0.35%. It was found, however, that, in surface soils with a higher total soluble solid content than this, cane would grow if its roots penetrated into a less toxic sub-soil. Surface soil contained most soluble salts before the rainy season. In the rainy season the salts were washed into the sub-soil, the soluble salt content of which consequently rose. It is considered, therefore, that in planting cane sets at the end of the dry weather the total soluble solid content of the surface soil should not be above 0.35%, while if sown during or at the end of the rainy season the soluble solid content of the 40-60 cm. horizon should be below 0.18%. C.W.S.H.

1116. HARDY, F.  
Phosphate and sugar-cane.  
*Proc. 1949 Mtg B.W.I. Sugar Tech.*, Antigua, pp. 39-47, bibl. in text.

Many manurial experiments in the West Indies have shown no responses to phosphates though the soils were deficient in phosphorus. Several possible reasons are given for these failures and it is suggested that the method of foliar diagnosis will be valuable in tracing the uptake of nutrients and determining the fertilizer requirements of soils. The growth-increment method is also considered to be promising. Some good responses have been obtained from high P-high N manuring. C.W.S.H.

1117. MARTIN, E. R. H.  
A brief review of results obtained in Antigua from experiments with large dressings of sulphate of ammonia and superphosphate.  
*Proc. 1949 Mtg B.W.I. Sugar Tech.*, Antigua, pp. 79-81.

Experiments with sulphate of ammonia and superphosphate dressings of 5 to 15 cwt. per acre on 5 clay soils have shown no appreciable effect on either plant cane or ratoon crops. The weather was exceptionally dry during the years of the experiments. C.W.S.H.

1118. ROBINSON, J. B. D.  
The results of sugar-cane manurial trials with phosphate in Barbados.  
*Proc. 1949 Mtg B.W.I. Sugar Tech.*, Antigua, pp. 48-62, bibl. 9.

On the coral limestone soils of Barbados there were certain reasons for believing that phosphates might be required. Nevertheless, a long series of experiments between 1929 and 1938 gave no responses to phosphate manuring. Recent experiments with high nitrogen and high phosphate manuring (up to 10 cwt. each of sulphate of ammonia and superphosphate per acre) have also given negative results. C.W.S.H.

1119. INNES, R. F.

**Plant analysis in relation to the nutrition of sugar cane in Jamaica.**

*Proc. 1948 Mtg B.W.I. Sugar Tech., Barbados*, pp. 92-114, bibl. 14.

The quantity of N, P and K used annually by the Jamaican sugar industry is discussed with reference to the estimated amounts of these elements removed by the crop. The figures indicate a need for more accurate methods of fertilizer control, and the various methods tried in the past are reviewed. The author is particularly concerned with plant analysis and he discusses the composition of leaf material of different ages taken at various stages in the life of the crop. A detailed survey is described in which analyses were based on the 3rd fully open leaf when plant cane was 8-10 months old and ratoons 5-6 months old. The data indicate a pronounced relationship between leaf composition and the major soil types. Existing fertilizer practices need critical examination, and further work on developing the use of leaf analysis for fertilizer advisory purposes seems warranted. It has been shown that relative yield responses to increasing applications of N, whether under irrigated or non-irrigated conditions, were very closely related to the relative responses in leaf N (as % dry matter) measured in the preceding August, some 8 months earlier, and that this relationship was linear throughout.

1120. KELSICK, R. E.

**A note on high nitrogen and phosphate experiments with sugar cane [in St. Kitts].**

*Proc. 1949 Mtg B.W.I. Sugar Tech., Antigua*, pp. 82-3.

Three experiments on St. Kitts upper lands which had not previously received pen manure gave varying responses to dressings of 1 to 4 cwt. per acre of sulphate of ammonia and 1 to 6 cwt. of superphosphate. In one case 2 cwt. of superphosphate gave an increase of 10 tons per acre of cane, but higher dressings were uneconomic. Elsewhere responses to these fertilizers did not cover their cost.

C.W.S.H.

1121. BLACKBURN, F. H. B.

**Some thoughts on trends in the yield of sugar cane in Trinidad.**

*Proc. 1949 Mtg B.W.I. Sugar Tech., Antigua*, pp. 68-78, bibl. 22, illus.

Figures are given showing that yields in British Guiana have followed the magnitude of sulphate of ammonia dressings and that in Barbados yields have been correlated with rainfall. Trinidad yields have shown considerable fluctuations and expected gains from manuring have not occurred. Observations and experiments indicate that fertilizer applications have been unbalanced and that potash deficiency is widespread. It has been shown that the correction of this deficiency can lead to considerable yield increases.

C.W.S.H.

1122. RAHEJA, P. C., AND AZEEZ, M. A.

**Analysis of agricultural yields. I. Multiple-factor experiment on spacings × nitrogen doses × time of application of nitrogen.**

*Indian J. agric. Sci.*, 1948, 18: 113-21, bibl. 28 [received 1950].

An experiment with sugar cane has been conducted

over 5 years on plant crops to determine the most suitable spacing, nitrogen dressing, and time of application of nitrogen for the N.-W. Frontier Province. Spacing at 2½ ft. was found to give a higher cane and C.C.S. yield than either 3 ft. or 3½ ft., though the wider spacing gave a slightly higher C.C.S. percentage. The differences were not, however, significant. In two out of the three normal years when drought did not occur, the higher applications of N (in the form of compost) gave significant yield increases. The rates of application were 50, 100 and 150 lb. N per acre. 150 lb. per acre gave the highest total C.C.S. yield for the five years. Applications of N in a full dose at planting gave a higher cane yield and a high C.C.S. percentage and is therefore considered a better practice than splitting it into two or three applications.

C.W.S.H.

1123. VALLANCE, L. G.

**Soil fertility investigations. Results of the 1949 season.**

*Cane Gr quart. Bull.*, 1950, 13: 154-60.

Soil fertility surveys, of which 24 have now been completed since 1940, were continued. In the latest samples, coming largely from the Tully district, 64% showed a low potash status and 25% low phosphate. The results of 7 NPK trials on different soil types are summarized, 4 being on plant canes. Responses to N were found in 5 cases, to K in 3 and to P in 2 cases. Two trials, one at Bundaberg and the other at Mackay station, are reported on the use of filter mud as a fertilizer. In the first trial no response has been shown in the plant or first ratoon crop to either fertilizer or mud at up to 50 tons per acre. In the Mackay trial, where 3 crops have been harvested, it is clear that the use of 40 tons mud per acre has not justified itself when compared with 20 tons. The value of the latter dressing has also proved doubtful, because combined with 3 cwt. of fertilizer it has only produced a yield increase over the 3 crops of 0.58 tons sugar per acre compared with fertilizer alone.

1124. CHAO, T. T., AND LI, K. Y.

**Field experiments on the amelioration of lateritic soils: effects of lime and magnesia applications. [Chinese, English summary ½ p.]**

*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 176-82, bibl. 4.

Lime alone, when applied to these lateritic soils, had no effect on growth or yield. Magnesia, with or without lime, increased yields of cane by 11-15% and of sugar by 8-11%. A mixed NPK fertilizer increased yields by about 25%.

C.W.S.H.

1125. BEAUCHAMP, C. E.

**Influence of the minor elements on sugar cane quality.**

*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 63-74.

Three experiments are described with tabulated yield data involving 3 varieties, namely old ratoons of P.O.J.2878, ratoons of Mayagüez 28, and plants of Media Luna 3/18. Treatments compared were NPK 10-10-0 or 10-10-10 and no fertilizer supplemented in some plots by either Cu, Zn or Mn, supplied as the sulphates at 50 lb. per acre. None of these minor elements improved the commercial yield of 96° sugar.



## 1126. INNES, R. F.

Some preliminary observations on the agricultural utilization of dunder.

*Proc. 1949 Mtg B.W.I. Sugar Tech., Antigua*, pp. 90-5, bibl. 7.

Dunder is the still effluent in the distillation of fermented molasses. An average sample contains 9.6% total solids and 0.74% K. Its disposal is a serious health problem, as careless disposal may lead to pollution of streams. Plant cane experiments in Jamaica have shown that dunder is a useful source of potash and, on potash-deficient soils, can be applied as a liquid manure at rates up to 30 tons per acre. Its use will depend on the economics of transport, but, where sulphate of ammonia is also to be applied, this can be dissolved in the dunder and total costs of application will consequently be reduced. C.W.S.H.

## 1127. BEAUCHAMP, C. E.

La cachaza como fertilizante. (Filter mud as a fertilizer [for sugar cane].)

*Suelo Tico*, 1949, 3: 414-21.

Dried filter mud, consisting of the insoluble impurities precipitated during the purification of the juice of sugar cane, contains on an average 60-85% organic matter, 1½-2% nitrogen, 3% phosphoric acid and 10-15% calcium phosphate, but no potassium. From a survey of the nutrient requirements of sugar cane, it is concluded that filter mud should make a valuable organic fertilizer for this crop, provided it were supplemented with dressings of potash. It may be applied in the fresh state to new plantations and allowed to decompose on the field; it should not, however, be incorporated with the soil lest it reduce the available nitrogen content during decomposition. The chief obstacle to its utilization is the cost of transport from factory to field, but this might be overcome by drying the mud before it is transported. Applications have been recommended of 5 tons undried mud per acre (57.75 tons dried mud per caballería of 33½ acres).

## 1128. WANG, S. C., AND YUAN, T. L.

A study on potash in bagasse ash. [Chinese, English summary ½ p.]

*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 169-75, bibl. 9.

The potash content of bagasse furnace ash is generally too low to be of value as a fertilizer. One-half to two-thirds of the potash is removed from bagasse in water sprayed during milling, and 20-30% is lost by volatilization during burning at high temperatures (800° C.) for 5-6 hours. Soil differences were found to affect the potash content of bagasse, but the influence of different cane varieties is obscure.

## 1129. VARMA, H. P.

Studies in nitrogen and carbohydrate metabolism of sugarcane.

*Indian J. agric. Sci.*, 1949, 19: 255-62, bibl. 8.

Total nitrogen decreased with age in all parts of the cane plant and was greater in the leaves than in the leaf sheaths and stems. Soluble nitrogen accumulated in the plant in the latter part of its life and this accumulation was particularly noticeable in the stem. Amide nitrogen increased with age in all parts of the plant and sugar increased with age in the leaves. Yellowing

not connected with any fungus disease has been common in August and September during the last few years. This condition led to decreased protein and increased sugars. Pyrilla attack, however, decreased both protein and sucrose in the leaf. C.W.S.H.

## 1130. PRATT, O. E., AND WIGGINS, L. F.

The constituents of sugar cane juice. Part I. The identification of the amino acids.

*Proc. 1949 Mtg B.W.I. Sugar Tech., Antigua*, pp. 29-38, bibl. 8, illus.

The method of identifying amino acids by paper partition chromatography is described and details of the apparatus used are given. Both one-dimensional strip chromatograms and two-dimensional, square map chromatograms were used. Canes from Jamaica and Barbados were studied and there were indications that there were distinct differences in the amino acid content of different parts of the cane. C.W.S.H.

## 1131. KRISHNA, P. G.

Investigations on the alkalinity and saltiness in *gur* made from Coimbatore sugarcane varieties.

*Indian J. agric. Sci.*, 1949, 19: 163-79, bibl. 13.

Complaints were made that the variety Co.213 produced *gur* which was salty. Investigations carried out because of this complaint showed that alkalinity of *gur* ash varied with the soluble salts in the soil and irrigation waters. Alkalinity of *gur* was lower, and the flavour less salty, in ratoon than in plant cane crops. Varieties Co.419 and 434 gave sweet *gur*; Co.290, 301 and 244 gave salty *gur*. There was no correlation between taste and total alkalinity; saltiness occurred when chlorides exceeded 0.5%. C.W.S.H.

## 1132. BARNES, A. C.

The importance of meteorological records [for sugar estates].

*Proc. 1948 Mtg B.W.I. Sugar Tech., Barbados*, pp. 81-6.

Adequate meteorological records are needed as a guide to the selection of varieties of cane, cultural practices, irrigation, crop prediction and reaping programmes. The author propounds a scheme for obtaining such records, in which small estates, large estates, groups of estates in well defined climatological areas and central stations will all play a part. The records to be kept are indicated. It is suggested that the presence of micro-climates in irrigated areas requires special study.

## 1133. PINTO F., R. J.

Efectos de la sequia sobre el rendimiento de la caña. (The effects of drought on the yield of sugar cane.)

*Suelo Tico*, 1949, 2: 379-84.

A physiological explanation of the fact that the yield of cane depends on the time at which it is cut in relation to the amount and distribution of rain that has fallen during the year and the soil type.

## 1134. WARREN, G. T.

The effect of drought on chemical control.

*Proc. 1948 Mtg B.W.I. Sugar Tech., Barbados*, pp. 124-6.

Prolonged drought in Antigua reduced absolute juice extracted per ton of cane from an average of 170.40 gal.

in 1942-46 to 165.35 gal. in 1947 and 153.24 gal. in 1948. Average figures for juice analyses are tabulated which suggest that under extreme drought conditions there is some optically active substance formed in cane which affects the pol. readings.

1135. BEAUCHAMP, C. E.

**The influence of rainfall on the quality of sugar cane.**

*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 41-62.

An account with tabulated data is given of conclusions reached from studies over a number of years in the Camagüey province of Cuba. The relationships existing between rainfall, its amount and distribution, and soil type on the one hand, and sugar content and quality on the other, are discussed, and recommendations made for harvesting in relation to rainfall and soil.

1136. ASANA, R. D.

**Growth analysis of the sugar-cane crop in North Bihar (India). I. Seasonal variation in growth and yield in unmanured plots.**

*Ann. Bot. Lond.*, 1950, 14: 465-86, bibl. 14.

In North Bihar sugar cane is grown as an annual crop without irrigation. The average yield of millable cane approximates to about 15 tons per acre, and responses to manuring with N and P are inconsistent. Observations were made during 4 seasons in 6 different fields at Pusa, on the development of variety Co.313. Using the highest yielding field as a basis for comparison the smaller yields in the other fields appeared to be due to: (1) poor germination due to insufficient preparation of land, (2) partial drought, (3) deficiency of N, and (4) an unknown soil factor effecting temporary reductions in available N. The N supply was observed to have more effect than had the intensity of hot weather on tillering which is nearly completed by the time the monsoon sets in. Further investigation is needed on the influence of waterlogging in low-lying areas on the availability of N and on root activity and rate of leaf production in different varieties, as a basis for selecting varieties adapted to this condition.

1137. RAHEJA, P. C.

**Growth studies on *Saccharum officinarum*. II. Irrigation series.**

*Indian J. agric. Sci.*, 1948, 18: 95-111, bibl. 11 [received 1950].

In the Peshawar Valley a frosty period from December to February makes it desirable that the crop should mature earlier than this. Experiments have been conducted to determine the effect of irrigation intervals, methods of planting, nitrogen and other manual dressings, but this paper deals with the effect of irrigation intervals only. In two experiments covering four seasons the intervals were weekly, every 10 days, and at the "critical soil moisture limit", the latter being determined when active plant growth slowed down. Two acre-inches were applied at each irrigation in each treatment, but in the case of the weekly and ten-daily treatments irrigation was delayed by one day for every 0.2 in. of rainfall which fell between intervals. Environmental factors had a marked effect on the crop and a favourable early season was found to be more beneficial than favourable weather later on in the growing period.

Weekly irrigation gave maximum growth in height, increased the early growth and mean daily growth and hence increased the yield of the crop. However, the "critical soil moisture limit" treatment produced higher C.C.S. and a higher relative growth rate of the crop. It appears that under these conditions there is greater accumulation of sucrose because cellulose formation is limited by the restricted water supply.

C.W.S.H.

1138. KHANNA, K. L., AND RAHEJA, P. C.

**Further studies in the respiration of sugarcane *in situ*.**

*Indian J. agric. Sci.*, 1948, 18: 1-7, bibl. 2 [received 1950].

This paper describes a continuation of work on respiration of sugar cane, the first results of which were described in *Ibid.*, 1938, 8: 253-69. The respiratory activity of the varieties used is tabulated and expressed graphically. The work was carried on through four periods in each of two seasons, with readings taken for four time intervals during the day. The results showed that under drought conditions the rate of respiration decreased with the passage of time, but that drought resistant varieties did not reduce their respiration as rapidly as the other varieties. Co.213 and Co.356 reduced their respiration more rapidly than Co.313 and Co.331. Apart from this general result, however, there were differences in the response of varieties to the two seasons, and also significant interactions between the varieties and the four periods of recording.

C.W.S.H.

1139. KHANNA, K. L., AND RAHEJA, P. C.

**Respiration studies in sugarcane under partial submergence.**

*Indian J. agric. Sci.*, 1948, 18: 9-18, bibl. 7 [received 1950].

In northern Bihar many low-lying sugar cane fields are inundated during the monsoon. Sugar cane has been found to withstand this submergence much better than maize, but it has been recognized that some varieties of cane are less tolerant than others. Recordings were taken for up to 8 days of the respiration of foliage, stems and roots of both partially submerged and normal plants of 11 varieties. Submerged plants showed a generally higher rate of respiration than unsubmerged. Respiration curves of the foliage of 7 varieties were of different shapes according to whether the variety was tolerant, semi-tolerant or susceptible to submergence. The curves for root and stem respiration did not, however, exhibit these differences of shape. The tolerant varieties were Co.331, Co.326 and Co.285, semi-tolerant Co.281 and Co.313, susceptible Co.213 and Co.210. The ratoon crop of Co.213 was more tolerant than its plant crop.

C.W.S.H.

1140. BRANDES, E. W.

**Interdependence of light intensity and temperature in growth of sugarcane.**

*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 27-30, bibl. 2, illus.

This paper describes the results of studies made at the Cold Storage Laboratory, Arlington, Va., in 1940-41, on which reports have previously been published in *Sugar Bull.*, 1940, 18: 23: 3-5, and in *J. agric. Res.*, 1946, 7: 1-18. The experiments on species of both



*Saccharum* and *Erianthus* showed that there is a required photothermal balance for survival and growth of these plants. The author considers that these results may have considerable practical implications in the growing of sugar cane under the diverse conditions where it is now found.

1141. SUN, V. G., AND CHOW, N. P.

The effect of climatic factors on the yield of sugar cane in Tainan, Taiwan. Part 2. Multiple factors investigation. [Chinese, English summary 2 pp.]

*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 1-40, bibl. 15.

This is a study of the reaction of both spring and autumn planted cane to the climatic factors temperature and rainfall. The number of stalks per plant was greater, and the length of the elongation period was longer, in autumn than in spring planted cane. Rate of stalk elongation was found to be positively correlated with temperature and rainfall. This was true for both seasons and all varieties planted. The effect of mean minimum temperatures was much greater than that of mean maximum temperatures and of rainfall. The progressive effect of mean minimum temperatures was not, however, the same for all varieties. P.O.J.2883 needed relatively high temperatures for rapid elongation, and was therefore considered unsuitable for north Taiwan. Available sugar percentage was negatively correlated with monthly mean minimum temperatures in all cases. P.O.J.2878 increased its sugar content quicker than P.O.J.2883. C.W.S.H.

1142. KHANNA, K. L., AND SHARMA, S. L.

Lower epidermis of leaf midrib as an indicator of its hardness in sugarcane.

*Proc. Indian Acad. Sci., Sect. B*, 1949, 30: 307-15, bibl. 8, illus.

In studies at the Central Sugar Research Station, Pusa, the leaf midribs of 13 varieties of sugar cane were examined anatomically and also subjected to puncturing tests on the convex side to determine the hardness of the lower epidermis. Silica cells, though three times as numerous in some varieties as in others, were not found to have any consistent association with either resistance to puncturing or with the thickness of the outer cell walls. Significant varietal differences were found in the thickness of the outer walls of long cells in the epidermis and also in resistance to puncturing, and there was a positive correlation significant at 5% between these two characters. Erratic behaviour was, however, found in four varieties, Co.285, P.O.J.2725, Chin and Saraitha (the last two belonging to the Saraitha group); this was explained by abnormal development with respect to either the size and number of vascular bundles or the thickness of the sclerenchymatous cell walls.

1143. KHANNA, K. L., SHARMA, S. L., AND BANDYOPADHYAY, K. S.

Studies in the anatomy of sugarcane stalk. Part IV. Sampling technique for the evaluation of anatomical structure for comparative study.

*Proc. Indian Acad. Sci., Sect. B*, 1950, 31: 1-33, bibl. 12, illus.

Considerable information is presented on the variability in sugar cane stalks of (i) size of vascular bundles,

(ii) the thickness of cell walls and (iii) the size of cells in ground tissue. A sampling method is recommended for each. S.C.P.

1144. WILLIAMS, C. H. B., KNOWLES, W. H. C., AND CAMERON, C.

Further results of trials of modified cultivation systems for British Guiana.

*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 49-58, bibl. 6.

Second and/or first ratoon yields are tabulated for 6 cultivation trials reaped in 1947, and plant yields for 3 new trials. Several varieties were involved. Reduction in bed width from the standard layout of 36 ft. with cross rows to 24 ft. or 18 ft. has always proved advantageous, and usually significantly so, irrespective of whether long rows or cross rows were used. Even with 36 ft. beds long rows showed no disadvantage compared with cross rows, and used with narrower beds they have been generally clearly superior. In one trial a single row bed of 5 ft., similar to the so-called Louisiana system, has given promising results up to the second ratoon. The Cameron-Williams system of cultivation, while improving on standard practice, has given variable results in the older trials; in the new trials involving modifications of the system no significant differences have been found among plant crops. Comparing methods of drainage the use of tile drains produced significant yield increases in plants but their effect has declined with ratooning. The use of sand drains in two trials has increased yields but not to a significant extent. In two trials hilling up of ratoons has not proved superior to flat forking, and in one case neither hilling up nor flat forking showed any improvement over no tillage. In two trials, in which closer spacing of rows and the use of more tops per row than is usual gave increased plant yields, no such advantage has been found in the first ratoons.

1145. CHENG, C. F., AND CHEN, M. C.

A search for the causes of difference in the flowering tendency of sugarcane plants grown on the different sides of a field. [Chinese, English summary 2 pp.]

*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 41-58, bibl. 9.

Arrows were earlier and quicker to form on the west edge of a field than on the other sides. A higher eventual arrow percentage was found on the north side, though many of these arrows were too late to tassle. Florets were also slower to open on the north side. On the south side growth was better, the canes being taller and thicker and the internodes greater in number. It was considered that the differences were due to the different amounts of sunlight falling on the plants when they had grown tall; this led to air temperature differences, with higher temperatures on the south side. Differences in the amount of shelter from winds may have been a subsidiary cause of the differences in arrowing. C.W.S.H.

1146. MALBERTY GARCÍA, F.

New technique for cultivating and laying by sugar cane.

*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 89-92, illus.

A description with illustrations is given of the tractor-mounted William cultivator which can be used to bar off and lay by the cane [cut back and cultivate the stools] without either turning or removing the trash and without earthing up the stools. It is claimed that its use increases yields by 10% to 15% and reduces the cost of the operation by 80%.

1147. KNUST, H. G.

**A machine for planting velvet beans.**

*Cane Gr. quart. Bull.*, 1950, 13: 164-6, bibl. 1, illus.

The use of velvet beans as a cover crop for the protection of cane lands during the fallow period is becoming increasingly popular in the southern district of Queensland, and the demand for seed now exceeds the supply. A simple home-made planter is described which was fitted to the cultivator frame of a Farmall Model A.V. type tractor. With one man driving the tractor and two dropping the seed, slightly more than 1 acre per hour was sown, and a satisfactory stand of beans was obtained from a seed rate of 12 lb. per acre compared with about 45 lb. needed when seed is broadcast.

1148. ANON.

**Cane harvesters in Australia.**

*Sugar, New York*, 1950, 45: 10: 32-3, illus.

A brief account is given of 4 cane harvesters in use in Queensland, namely the Toft, Fairymead, Moloney and Kinnear. The last of these is the most recent and not only cuts and tops cane but bundles it as well. It is of simple construction and moderate price, and three photographs show it in use.

1149. JAMIESON-CRAIG, T.

**The reaping and transport of sugar cane.**

*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 127-39.

Out of 110 sugar estates in the British West Indies, 26 replied to a questionnaire on methods of reaping, loading and transporting cane. The methods used and estimated costs are discussed, but fuller information will be needed to provide a satisfactory basis of comparison between territories. The questionnaire used is set out in full.

1150. KNUST, H. G.

**A trailer for cane haulage.**

*Cane Gr. quart. Bull.*, 1950, 14: 36-8, illus.

A method is described whereby a tramline cane truck can be carried into the field on a tractor-drawn trailer, loaded and then brought back to the tramline. It runs from trailer to tramline on special rails. C.W.S.H.

1151. BARNES, A. C.

**Plant protection services in relation to the sugar industry.**

*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 74-80, bibl. 7.

The problem of plant protection as applied particularly to sugar cane is discussed from two viewpoints, namely, natural agencies, i.e. insect pests, diseases, weeds, rats, and unusual rainfall and soil erosion, and artificial agencies, i.e. improper soil treatment, faulty drainage, avoidable damage by implements, animals and labour, and unsuitable irrigation practices. The need for improvements in the existing plant import laws in the Caribbean territories is stressed.

1152. HUGHES, C. G.

**Cane diseases.**

*Aust. Sugar J.*, 1950, 41: 719-23.

In north Queensland the 6 main cane diseases in order of their present or potential importance are: ratoon stunting (or Q.28 disease), leaf scald, chlorotic streak, downy mildew, gumming, and red stripe or top rot. Ratoon stunting and chlorotic streak are believed to be caused by viruses, downy mildew is caused by a fungus and the other three by bacteria. Symptoms and control measures are described.

1153. HUGHES, C. G.

**Testing sugar cane varieties for resistance to disease.**

*Cane Gr. quart. Bull.*, 1950, 14: 16-19.

A description is given of the organization for testing cane varieties for resistance to all diseases occurring in Queensland. The resistance trials are carried out at centres in different parts of the territory, that are isolated from commercial cane farms. The canes for testing are either inoculated with the disease or sufficient points of infection are provided in the trials, and are tested against a series of standard canes with a known range of resistance to the disease concerned.

C.W.S.H.

1154. H[UGHES], C. G.

**The disease resistance of approved cane varieties.**

*Cane Gr. quart. Bull.*, 1950, 14: 44-5.

A table showing the resistance of approved varieties of cane to red rot, Fiji, downy mildew, leaf scald, gumming, toprot, chlorotic streak and mosaic.

C.W.S.H.

1155. KNOWLES, W. H. C.

**A note on the use of organo mercurial compounds for the treatment of sugar cane cuttings in British Guiana.**

*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 59-62.

Preliminary results are reported for 5 experiments on the use of organo-mercurial compounds for treating sugar cane cuttings. The effect of immersing the cut ends of setts for 2-3 seconds in Aretan (Atiran) solution on percentage germination has been variable. Comparing the effects of dipping in Aretan with dipping in Abavit S, soaking overnight in water, and soaking in water plus Aretan dipping gave negative results. In one trial when dipping markedly improved germination 1% Aretan proved more effective than 0.5% Aretan. In another trial with 3 varieties, B.37161 responded significantly to treatment, whereas improvements with B.34104 and D.26/39 were not significant. It is suggested that the use of organo-mercurial dips in British Guiana will only prove economic when planting conditions are such as to render germination subnormal.

1156. CHU, H. T., AND WANG, S. C.

**Effect of several fungicides on the pathogens of some important diseases of sugar cane. 1.** [Chinese, English summary  $\frac{1}{2}$  p.]

*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 202-9, bibl. 9.

Organic mercuric fungicides Ceresan, Granosan and Uspulum were compared with  $\text{HgCl}_2$  and  $\text{CuSO}_4$  for the control of *Ceratostomella paradoxa*, *Colletotrichum*



*falcatum*, *Cytospora sacchari*, *Fusarium moniliforme* and *Cercospora vaginiae* on cane setts. In pot trials 0.1% Ceresan and 0.2% Granosan proved more effective than 0.1%  $\text{HgCl}_2$ . Basic  $\text{CuSO}_4$  had less fungicidal power than crystal  $\text{CuSO}_4$ . C.W.S.H.

## 1157. KIRYU, T.

A method of determining varietal resistance of sugar cane to red rot. [Japanese, English summary.]

*Ann. phytopath. Soc. Japan*, 1940, 10: 156-70, from abstr. in *Jap. J. Bot.*, 1941, 11: (97) [received 1950].

The fungus, *Colletotrichum falcatum*, was cultured on cane juice for 4 days at 28° C. It was then inoculated into the cane stalks. The extent of the affected tissue at harvest time was used as a measure of varietal resistance.

## 1158. VARMA, S. C., AND MITAL, S. P.

The structure of xylem vessels in the nodal region of sugarcane in relation to its resistance to red-rot (*Colletotrichum falcatum* Went.).

*Indian J. agric. Sci.*, 1949, 19: 383-7, bibl. 3, illus.

Following similar investigations in Louisiana it was found that with varieties susceptible to red-rot (Co.312 and Co.213) ink particles from Indian ink suspensions were carried across the nodes through a larger number of vascular bundles than was the case with resistant varieties (Co.393, Co.453 and desi dhur). Septa in the nodes were found in Co.393. Red-rot spores have been found in xylem vessels after immersion of cane tops in spore suspensions. It is considered, therefore, that susceptibility is due to ease of migration of spores through vascular bundles, and that the Indian ink test gives a good laboratory measure of varietal red-rot resistance. C.W.S.H.

## 1159. SIMMONDS, F. J.

The biological control of insect pests of sugar-cane in the West Indies.

*Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 66-73.

A review of work under the control of the Commonwealth Bureau of Biological Control through its sub-station in Trinidad.

## 1160. CHU, H. T., AND TSAI, T. K.

Studies on the dead stalks of cane crop. (The 2nd report.) [English summary 2½ pp.] *Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 183-201, bibl. 7.

Records were kept of tillers formed and stalks dying during the growth of an autumn planted, a spring planted and a ratoon crop. Four varieties were used. The percentage of dead stalks to tillers formed was 72.3 in the ratoon, 53.7 in the autumn and 36.8 in the spring crop. Insects were almost entirely responsible for stalk death in the ratoon crop but fungus diseases caused 20% of the deaths in the autumn planted crop. F.108 and P.O.J.2725 were most susceptible to insect damage, but P.O.J.2725 was also much affected by fungus diseases of which red rot and cytospora disease were the most important. An unknown disease was also observed. P.O.J.2878 showed the lowest number

of dead stalks and the highest yield throughout these trials. C.W.S.H.

## 1161. SCARAMUZZA, L. C., FERNÁNDEZ ARTILES, R., AND FERNÁNDEZ PÉREZ, J.

Controlling the sugar cane borer in Cuba by biological control.

*Proc. 22nd annu. Conf. Asoc. Téc. Azuc. Cuba*, 1948, pp. 37-40.

Infestation by *Diatraea saccharalis* has continued to decline for the fourth consecutive year on plantations where the Cuban fly, *Lixophaga diatraeae*, has been artificially multiplied and liberated. The process being followed was described in the *Proc. 21st annu. Conf.*

## 1162. MUNGOMERY, R. W.

"Greyback" grub control with benzene hexachloride.

*Cane Gr. quart. Bull.*, 1950, 13: 160-4, illus.

The story of the various control measures tried in the past against the greyback cane beetle is outlined. BHC has proved outstandingly successful. For the normal planting practice of one plant and two ratoon crops it is recommended that 150 lb. of 10% dust be applied per acre in bands about 15 in. wide along the plant cane rows when these have developed to the stage at which the furrows are closed. For a two-crop cycle 125 lb. is adequate and for a single crop 100 lb. In some areas where ratooning practices involve slicing away a considerable portion of each side of the stool a supplementary dressing of 50 lb. per acre may be needed immediately after ratooning; otherwise the initial dressing should afford sufficient protection to ratoon crops as well as plants. The latest information indicates that a 20% dust used at half the above rates will prove cheaper than the 10% dust, and the cost of treatment should not exceed £(A)1-10 per acre per annum. A full report is to be published shortly.

## 1163. BLACKBURN, F. H. B.

Further experiments on the control of the sugarcane frog hopper.

*Proc. 1949 Mtg B.W.I. Sugar Tech.*, Antigua, pp. 122-30, bibl. 3.

Up to 1945 the only successful control measures were cyanogas against the nymph, and pyrethrum, by drift dusting, against the adult. Later experiments showed that BHC and DDT could be used successfully against the nymphs. A series of experiments in 1949 showed that 0.5% chlordane applied at the rate of 200 gal. per acre controlled first and second brood nymphs when applied in April or June. DNOC, E605 and toxaphene did not control the nymphs, but 3% chlordane at 1 cwt. per acre was as successful as 1 cwt. per acre of 5% BHC. C.W.S.H.

## 1164. JARAMILLO J., G.

Nueva e importante plaga de la caña de azúcar en Venezuela. (A new and important pest of sugar cane in Venezuela.) *Agric. venezol.*, 1950, 14: 141: 40-1.

A trial plot of sugar cane, grown at Chivacoa in Venezuela, was found to be heavily infested with a homopterous, leaf-sucking insect identified as a species of *Kelisia*. Contact insecticides are recommended for control.

1165. KHANNA, K. L., NIGAM, L. N., AND BANDYOPADHYAY, K. S.  
Studies in sampling technique. Part II. Estimation of *Pyrilla* incidence in sugarcane. *Proc. Indian Acad. Sci., Sect. B*, 1950, 31: 34-44, bibl. 3, illus.

Two plots of sugar cane, each 60 ft. square and infested with *Pyrilla*, were divided into units, each representing 3 ft. of row. In order to measure the different characters with a standard error of 7%, the following proportions of the total number of units had to be measured: (i) Proportion of dry leaves affected, 4.75%; (ii) Number of egg masses per affected cane, 16.25%; per green leaf, 14.75%; and per affected dry leaf, 6.00%. S.C.P.

1166. KHANNA, K. L., SHARMA, S. L., AND HUSSAIN, M. Z.  
On *Pyrilla* infestation and varietal resistance in sugarcane. *Curr. Sci.*, 1950, 19: 251-2, bibl. 3, illus.

Detailed observations on *Pyrilla* infestation of sugar cane at Motipur have shown significant differences between 5 varieties. The morphological and anatomical characteristics of the leaves are compared for 3 varieties, B.O.3, the least susceptible, and B.O.11 and B.O.24, the most susceptible. Work on the problem is continuing.—Central Sugar Res. Stat., Pusa.

1167. WOLCOTT, G. N.  
The sugar-cane rhinoceros beetle. *J. econ. Ent.*, 1950, 43: 385, bibl. 3.

When the giant Surinam toad, *Bufo marinus*, became abundant in Puerto Rico the sugar-cane rhinoceros beetle, *Strataegus barbigerus*, apparently disappeared from the fauna of the island. As the introduced toad population decreased, specimens of the beetle have again been found.

1168. CLAYTON, J. L.  
The C.C.S. formula. *Aust. Sugar J.*, 1950, 41: 723-7.

The C.C.S. (commercial cane sugar) formula used in Queensland as a basis for cane payments is discussed in some detail. The author considers that the system has outstanding advantages and is probably the best in use anywhere in the world.

1169. WIGGINS, L. F.  
The chemical aspects of the sugar cane. *Proc. 1948 Mtg B.W.I. Sugar Tech.*, Barbados, pp. 14-18.

The author suggests that sugar cane offers almost as great possibilities as does coal as a source of raw materials for the chemical industry. Nineteen primary substances readily obtainable from sugar cane are listed, and the many uses to which some of these can be put are discussed.—Imperial College of Tropical Agriculture, Trinidad.

1170. KHANNA, K. L., AND CHACRAVARTI, A. S.  
Studies in the clarification of sugarcane juice in *gur* manufacture. *Indian J. agric. Sci.*, 1949, 19: 137-61, bibl. 4.

No electrolytes were found which were superior to the

mucilaginous extract of *Hibiscus esculentus* stems (*bhindi*) as a means of juice clarification in *gur* manufacture. A water extract of castor seeds or groundnuts was, however, much superior to *bhindi* mucilage, and was considered to be well suited to village conditions. C.W.S.H.

## Tea.

(See also 1187i, s, 1224.)

1171. MORRISON, R. D.  
Tea—its production and marketing. *Publ. Tea Centre*, 22 Regent Street, London, 3rd Impression 1948, pp. 24, illus. [received 1950].

This popular illustrated booklet outlines the types of tea grown, the general conditions of cultivation practised in India, Ceylon, Indonesia and East Africa, the manufacture of black, green and Oolong tea, and the marketing of tea in London.

1172. HARLER, C. R.  
Tea seed gardens: details of procedure and experience in Assam. *Nyasaland agric. quart. J.*, 1949 (published August 1950), 8: 97-103.

Tea seed gardens are becoming increasingly important in Nyasaland owing to prohibition of seed imports from countries where blister blight occurs, and because estates are now expected to yield at least 1,200 lb. per acre and the economic life of fields is therefore not expected to be more than 40 years. Details of the planting and care of seed gardens in Assam are given, together with information on selection, collection and sorting of seed and the quantities of seed and area of seed gardens required. C.W.S.H.

1173. HARLER, C. R.  
Climate and tea production: a study of rate of cropping, factory equipment, climate and quality. *Nyasaland agric. quart. J.*, 1949 (published August, 1950), 8: 80-90.

The climate, and in particular the temperature ranges, of the main tea-growing areas of the world are compared. The main factor deciding whether cropping is seasonal or perennial is the temperature range over the whole year irrespective of the actual mean temperature, provided the latter is not very low. Monthly output in the perennially plucked areas normally rises in the rainy season, though in South India the crop is low in the colder and cloudy mid-monsoon period. Factory equipment depends largely on crop distribution and typical equipment in Assam and South India is described. Equipment suitable for Nyasaland is suggested. A comparison is made between the climate and crop distribution of Upper Assam and Nyasaland. Although in many respects the climates are similar, the rainfall in Nyasaland is much less reliable, minimum temperatures are lower and the atmosphere is drier. The effect of climate on quality is discussed and, by comparison with other countries, it is suggested that in Nyasaland the highest quality tea will be made from unpruned bushes in the slow growing May to June period. C.W.S.H.



## 1174. SIMURA, T.

**A study of the frost resistance of teaplants.**

[Japanese, Esperanto summary.]

*Proc. Crop. Sci. Soc. Japan*, 1940, 12: 98-114, from abstr. in *Jap. J. Bot.*, 1941, 11: (115-16) [received 1950].

In winter the degree of cold resistance is approximately proportional to the water content and to the osmotic pressure of the individual plant. Experiments have shown that the less susceptible the plants are to damage by a 1% solution of potassium iodide, or the less readily the leaves take up a 0.01-0.1% eosin stain, the greater is their resistance to cold.

1175. H[ARRISON], C. J., AND G[LOVER], P. M.  
**Fertilizer position (1951).***Serial Tocklai* 81, 1950, pp. 3.

Recommendations are made for the use on tea of N and P fertilizers released by the Government of India for the industry in Assam and West Bengal in 1951. Suggestions are also made for the use of P on green manure crops and shade trees.

## 1176. SCHOOREL, A. F.

De landbouwkundige grondslag van snoei en pluk bij Assamthee. (**The pruning and plucking of Assam tea.**) [English summary 9 pp.]

*Arch. Theecult.*, 1950, 16: 127-281+24 tables, bibl. 103, illus.

A comprehensive review of methods of pruning and plucking of Assam tea, and of their effect on the physiology and yield of the plants and on the quality of the tea. Much of the information is based on the results of work carried out during the last 20 years at the Tocklai Experimental Station, Assam, St. Coomb's, Ceylon, and the West-Java Experiment Station, Buitenzorg; in addition, some of the author's own observations, made in West Java and not previously published in detail, are presented.

## 1177. HARLER, C. R.

**Seychelles grass in tea. A warning.***Nyasaland agric. quart. J.*, 1949 (published August, 1950), 8: 103.

Preliminary examination of experimental results suggests that Seychelles grass delays the spread of the tea bush after pruning. C.W.S.H.

## 1178. LOOS, C. A.

***Calonectria theae* N. Sp.—the perfect stage of *Cercospora theae* Petch.***Trans. Brit. mycol. Soc.*, 1950, 33: 13-18, bibl. 7, illus.

A study of the nomenclature of a fungus which causes a well-known leaf disease of tea in Ceylon and South India.—Tea Research Institute of Ceylon.

## 1179. DE JONG, P.

**Report on the preliminary experiments on the control of blister blight on tea in bearing.***Plant. Chron.*, 1950, 45: 478-83, bibl. 4.

Control by knapsack spraying was considered impracticable under South Indian conditions owing to the large labour force required and the difficulty of water supply. Dusting was considered the method most likely to be successful. Power dusters have operated in Travancore at the rate of 40 acres per hour. Experiments were carried out using copper fungicides in talc

dusts. These had no effect on the made tea, and the increase in the copper content of the tea was not serious. The year of the experiments was a dry one and the incidence of blister blight disease was light. Nevertheless, eye-judgement scores of infection, and figures of the percentage of random shoots infected, showed some measure of control. A 7½% dust at 35 lb. per acre was most satisfactory. C.W.S.H.

## 1180. VAN EMDEN, J. H., AND REITSMA, J.

Verslag van een studiereis naar Ceylon en Zuid-India, teneinde de blisterblight ziekte van de thee te bestuderen. (**Report on a visit to Ceylon and South India to study the effect of blisterblight on tea plantations.**)

[English summary 2½ pp.]

*Arch. Theecult.*, 1950, 17: 5-70, illus.

Blister blight disease seemed to cause less damage in Ceylon than it does in Sumatra, and the following factors are suggested as possible reasons for this: (1) less shade, clean weeding and smaller bushes produce a less humid microclimate; (2) the Ceylon jâts are less susceptible; (3) the lower temperature results in a less rapid growth of the fungus. The value of cultural practices, such as reduction of shade, heavy manuring, destruction of the apical buds and spraying, in reducing losses due to the disease are discussed. In addition, notes are given on vegetative propagation, manuring and labour conditions in Ceylon and on the occurrence of phloem necrosis and *Poria*. In South India a correlation was observed between shade control and the incidence of blister blight. Slope pruning and slope plucking seemed to be effective in controlling the disease. A paper in English on the Blisterblight situation in Sumatra and the measures that are being taken to control it, given by the authors at the symposium on blister blight held at Nuwara Eliya, Ceylon, is published as an appendix [see *H.A.*, 20: 2071].

## 1181. SIMURA, T.

**Further studies on the resistance of tea to brown blight.** [Japanese, English summary.]*Jap. J. Genet.*, 1940, 16: 246-56, from abstr. in *Jap. J. Bot.*, 1941, 11: (116) [received 1950].

Results of chemical analyses of tea leaves indicated that the degree of resistance to brown blight (*Guignardia camelliae*) depends on the nitrogen/tannin ratio in the leaves, those of resistant varieties generally containing more tannin and less nitrogen than those of susceptible varieties. The juice extracted from the leaves of resistant varieties inhibited the growth of the causal fungus, whereas that from the leaves of susceptible varieties permitted vigorous mycelial growth. When tannin was removed from the juice, the degree of resistance was proportional to the amount of nitrogen in the juice. It was also found that caffeine inhibited mycelial growth of the fungus, while peptone, asparagine, glutamic acid and glycochol promoted it.

**Other crops.**

(See also 1014, 1019, 1187b.)

## 1182. WEST, O.

**Indigenous tree crops for Southern Rhodesia.** *Rhod. agric. J.*, 1950, 47: 204-17, bibl. 11, illus.

Southern Rhodesia is fortunate in possessing a rich flora of leguminous trees producing edible pods, which, falling to the ground during the dry season without shedding their seeds, provide valuable supplementary feed for stock. The following species are described: *Acacia albida*, *A. giraffae*, *A. woodii*, *A. litakunensis*, *A. subalata* (= *A. benthami*), *Dichrostachys glomerata* and *Piliostigma thonningii*. The chemical composition of the pods is tabulated, and estimates of yields given. The abrasion of seed coats to facilitate germination is mentioned.

## 1183. RIAL ALBERTI, F.

El sapote blanco (*Casimiroa edulis*), frutal exótico cultivado en la región de Orán (Salta). (The white sapote (*Casimiroa edulis*), an exotic fruit cultivated in the district of Orán, Argentina.)  
*Rev. Invest. agric. B. Aires*, 1949, 3: 305-8, bibl. in text, illus.

The tree seems to thrive in gardens in the district of Orán, to which it was introduced about 15 years ago. A botanical description and brief notes on the plant are given.

## 1184. BRIDGE, R. E., AND HILDITCH, T. P.

The seed fat of *Macadamia ternifolia*.  
*J. chem. Soc. Lond.*, 1950, pp. 2396-9, bibl. in text.

The seeds of *Macadamia ternifolia* were found to contain a high content of a fatty oil resembling olive oil in general character, though the two oils are made up of different component acids.—Liverpool Univ.

## 1185. HAVARD DUCLOS, B.

Le mangoustancier. (The mangosteen.)  
*Fruits d'Outre Mer*, 1950, 5: 161-6, bibl. 4, illus.

A discussion of the cultural requirements of the mangosteen and a description of methods of raising and growing the tree in French Indo-China and in other territories. Modern air transport facilities should make this excellent tropical fruit accessible to the European consumer.

## 1186. VASCONCELLOS, P. W. C.

Mais algumas observações sobre o imbuzeiro e sua enxertia sobre cajá-mirim. (Further observations on *Spondias purpurea* and grafting it on *S. lutea*.)  
*Rev. Agric. Piracicaba*, 1949, 24: 216-24, illus.

Observations are made on the performance of the Spanish plum, *Spondias purpurea*, in Brazil, when grown from seed or grafted on to the hog plum, *S. lutea*. The plant can be grown satisfactorily from seed, but when sown in the open it will not be ready for planting out for over a year from sowing, and may take as long as 20 years to come into bearing. Grafted trees make satisfactory, uniform growth, the trees come into bearing earlier, and the fruit is of better quality than that of seedling trees. Productivity, however, is low. The fruit ripens somewhat later than on seedling trees, which is an advantage in that the harvest comes at a drier season with the result that the fruit keeps better.

## Noted.

1187.

a ABREU VELHO, H. DE L., AND XABREGAS, J. L.  
Composição dos óleos de palma de Angola. (The composition of palm oils from Angola.) [English and French summaries  $\frac{1}{2}$  p. each.]  
*Agron. angol.*, 1950, 3: 133-42, bibl. 11, illus.

b ADSUAR, J.  
Studies on virus diseases of papaya (*Carica papaya*) in Puerto Rico. I. Transmission of papaya mosaic. II. Transmission of papaya mosaic by green citrus aphid (*Aphis spiraeicola* Patch). III. Property studies of papaya mosaic virus.  
*J. Agric. Univ. Puerto Rico*, 1947 (issued 1950), 31: 248-64, bibl. 15, illus.  
Originally published in 1946 as a separate technical paper [see *H.A.*, 19: 2439].

c BARBOSA, I. G.  
Alguns aspectos económicos da mecanização da agricultura em Angola. (Some economic aspects of the mechanization of agriculture in Angola.) [English and French summaries,  $\frac{1}{2}$  p. each.]  
*Agron. angol.*, 1950, 3: 73-93, bibl. 4.

d BERWICK, E. J. H., AND HAYNES, D. W. M.  
A report on a census of mechanical field equipment in use on estates in the Federation of Malaya, December, 1949.  
*Malay. agric. J.*, 1950, 33: 144-54.

e BLAIZOT, J., AND BLAIZOT, S.  
Essai biologique sur l'activité vitiminique d'un extrait caroténé retiré de l'huile de palme. (Biological assay of the vitamin activity of a carotene extract obtained from palm oil.)  
*Oléagineux*, 1950, 5: 634-8, bibl. 4, illus.

f BOWER, R. S., ANDERSON, A. D., AND TITUS, R. W.  
Determination of caffeine. A rapid semi-micromethod.  
*Analyt. Chem.*, 1950, 22: 1056-8, bibl. 7.

g BRAAK, H. R.  
Economische plaatskeuze van central fabrieken, in het bijzonder uit het oogpunt van transportkosten. (The location of central plants for the preparation of rubber, with special reference to transport costs.) [English summary 3 $\frac{1}{2}$  pp.]  
*Arch. Rubbercult.*, 1950, 27: 55-82, bibl. 8.

h BRANDES, E. W.  
Heterosis or hybrid vigor in sugarcane.  
*Proc. 22nd annu. Conf. Assoc. Téc. Azuc. Cuba*, 1948, pp. 31-6.

i BROUARD, J.  
Tea planting in Nyasaland.  
*Rev. agric. Maurice*, 1950, 29: 161-5.

j CUNHA BAYMA, A.  
A cana na pequena indústria. (Sugar production on a small scale.) [Publ.] *Minist. Agric. Rio de J.*, 2nd ed., 1949, pp. 35, illus.



- k DUFOURNET, R.  
Contribution à l'étude de la végétation spontanée des terres à caféiers d'Arabie dans le nord de Madagascar (région de Béalanana). (The spontaneous vegetation of *Coffea arabica* soils in the Béalanana region of north Madagascar.)  
*Agron. trop.*, 1950, 5: 292-7, bibl. 3, illus.
- l HIRSCHHORN, E.  
Un nuevo método de infección artificial con el carbón de la caña de azúcar. (A new method for artificially infecting sugar cane with smut [*Ustilago scitaminea*].)  
*Rev. Invest. agric. B. Aires*, 1949, 3: 335-44, bibl. 10.  
For use in the breeding of resistant varieties.
- m INFORZATO, R., AND DE SOUZA, A. J.  
Feijão guandú, *Cajanus cajan* (L.) Millsp. e as vantagens de seu emprêgo na adubação verde. (The pigeon pea, *Cajanus cajan*, and its value as a green manure crop [for restoring coffee soils].)  
*Bol. Super. Serv. Café, S. Paulo*, 1947, 22: 830-5, bibl. 6, illus. [received 1950].
- n KELSICK, R. E.  
Methods of sugarcane agriculture in standard use in St. Kitts.  
*Proc. 1949 Mtg B.W.I. Sugar Tech.*, Antigua, pp. 117-21.
- o KHANNA, K. L., AND BANDYOPADHYAY, K. S.  
Studies in sampling technique. Part III. Estimation of mite-incidence in sugarcane.  
*Proc. Indian Acad. Sci., Sect. B*, 1950, 31: 111-19, bibl. 8.
- p LÖW, I., AND ARGOU, S.  
Chromatographie du carotène de l'huile de palme. (A chromatographical study of the carotenoids of palm oil.)  
*Oléagineux*, 1950, 5: 629-33, illus.
- q MARTIN, E. R. H.  
Methods of sugar cane agriculture at present in use in Antigua (1949).  
*Proc. 1949 Mtg B.W.I. Sugar Tech.*, Antigua, pp. 18-23, bibl. 7.
- r RAO, D. A. A. S. N.  
Dielectric constants of cane sugar.  
*Curr. Sci.*, 1950, 19: 276-7, bibl. 6.
- s REITSMA, J., AND VAN EMDEN, J. H.  
De bladgallenziekte van de thee in Indonesië. (Blister blight of tea in Indonesia.) [English summary 1½ pp.]  
*Arch. Theecult.*, 1950, 17: 71-6, bibl. 4.
- t SILVA, P.  
The coccids of cacao in Bahia, Brazil.  
*Bull. ent. Res.*, 1950, 41: 119-20, bibl. 11.  
A review of records.
- u WANG, S. C., AND LAI, T. M.  
A study on the methods of determining lime requirement of sugarcane soils in Formosa. [Chinese, English summary 2 pp.]  
*Rep. Taiwan Sugar Exp. Stat.*, 1949, No. 4, pp. 125-46, bibl. 63.
- v WOLCOTT, G. N.  
A quintessence of sensitivity: the coffee leaf-miner.  
*J. Agric. Univ. Puerto Rico*, 1947 (issued 1950), 31: 215-19.

## NOTES ON BOOKS AND REPORTS.

## Books.

1188. ATKINS, F. C.  
*Mushroom growing to-day*.  
Faber & Faber, London, 1950, 9×5½ in., pp. 187, bibl. 28, illus., 12s. 6d.  
The author is well known from his writings on mushroom cultivation and from his intimate connexion with the Mushroom Growers' Association of Great Britain and Northern Ireland, and his book can be relied upon to give up-to-date information on the subject. It deals comprehensively with the various aspects of mushroom growing in the private garden, the nursery, and the commercial farm. The five sections describe: I. The background to mushroom growing (with accounts of what a mushroom is, and the history of the industry in Britain and abroad). II. Mushrooms as a sideline (how they are grown by the amateur, the country gentleman, the nurseryman, the market gardener, and under glasshouse conditions). III. Modern specialist requirements. IV. Other aspects of mushroom growing (the tray system, abnormalities, economics, food value). It is illustrated by 46 excellent photographs and a number of useful figures in the text. He who grows mushrooms for home consumption or for profit will find the information here presented of the utmost value, and any newcomer to the art should first study the book

carefully to see what pitfalls he may encounter, and if he does not find them too numerous and measures to obviate them too onerous, he should be able to succeed in the venture. H.W.

1189. BALDWIN, E.  
*Dynamic aspects of biochemistry*.  
Cambridge University Press, London, 1947 (reprinted 1948 and 1949), 9×6 in., pp. xviii+457, bibl. 2½ pp., 21s.  
"Verdict first and trial afterwards"? Then let it be pronounced deliberately and without qualification. This book is good, indeed, very good. The "trial" need consist of no more than an indication of the contents of the book. The central purpose of the author has been to show how our knowledge of intermediary metabolism has been built up into the complex of reactions generally known as "the tricarboxylic acid cycle" together with the related side reactions. In the author's own words: "While it is probable in the extreme that a great deal still remains to be discovered about this catalytic cycle and its side reactions, there can be little doubt of the great and fundamental importance of the system as a whole, both as a clearing house for the oxidation of the many products formed on the metabolic lines which converge upon it, and as a meeting-place for the main metabolic

pathways of carbohydrate, fat and protein. . . . We shall find variations on the general, fundamental theme, we may be sure. . . . But, . . . there is every reason to think that we shall discover evidence of a common metabolic ground-plan to which living cells in general conform."

The book is divided into two parts. Part I, consisting of five chapters, deals first with the general behaviour and properties of enzymes, including the energetics and kinetics of enzymic reactions, after which prosthetic groups, co-enzymes, inhibitors and similar topics are discussed. This is followed by an account of the specific properties of enzymes which are grouped under the headings "Hydrolases and phosphorylases", "Oxidising enzymes" and "Other enzymes", the latter heading including adding, -transferring and isomerizing enzymes.

Part II, which occupies eleven chapters, begins with a short discussion of the uses and limitations of the more common experimental methods of investigating intermediary metabolism. This is followed by chapters dealing with food absorption and digestion, the metabolism of proteins and amino acids and of other nitrogen compounds, alcoholic fermentation, the anaerobic metabolism of carbohydrates in muscle and liver; the aerobic metabolism of carbohydrates and the metabolism of fats. A short bibliography of key references and adequate author and subject indices are appended. Throughout, by just the right blend of critical appraisal and judicious speculation, the author has succeeded in presenting his subject as a clear and coherent picture. Of the many other praiseworthy features of the book, space will permit the mention of two only here. First, the persistent way the author reminds the reader that life requires energy and that therefore not only the chemical but also the energy balance must be kept in mind; secondly, the sound pedagogic instinct of the author which led him to devise his "whirligigs" which enable him to represent reaction chains with clarity and conciseness.

The author has earned the warmest gratitude of biochemists and physiologists, not only of the younger generation, who will find this book a valuable *point d'appui* for further studies, but also—dare it be said?—of not a few of their elders who, preoccupied with other things, regard the pile of unread journals and reviews on their desks and sadly murmur, "*Eheu fugaces labuntur anni!*"

A.E.B.

1190. BAWDEN, F. C.

*Plant viruses and virus diseases.*

Chronica Botanica Co., Waltham, Mass., and Wm. Dawson & Son, London, 3rd edition, 1950, 10½ × 6½ in., pp. 327, bibls. numerous, illus., \$6.00 or 48s.

This is a new edition, "almost entirely rewritten", of a remarkable book. It is remarkable in several ways; not only is the style unusually readable for a scientific book, with the material well arranged so that each chapter is self-contained, but such a wide range of sciences is covered that one is inclined to ask, "What kind of man is this who can master the fields of biology and roam beyond into protein chemistry and crystallography?" Mr. Bawden has surveyed critically virus research up to the end of 1949. His interpretation of research findings will be invaluable to those engaged on

virus research, and several of the chapters—the Introduction and those on Symptoms of Infected Plants, The Relations between Viruses and their Vectors, Virus Disease and Host-Plant Physiology, and Control Measures against Virus Diseases—may be of great interest to many engaged in agriculture and horticulture, as well as to entomologists, physiologists, and even to some in the heterogeneous group called the administrators.

Since the previous edition was written in 1942, the study of virus diseases has been intensified perhaps more than any other science except atomic physics. Many new virus diseases and vectors have been described and viruses have proved to be the cause of some long-known diseases, such as citrus decline. Most of this work receives only passing reference to some unusual feature, since this book is not intended as a descriptive textbook of plant virus diseases. It is rather with recent research on the viruses themselves and their vectors that the author is primarily concerned, and, with important exceptions like turnip yellow mosaic and clover club-leaf, most of this intensive work has been done with the "old stagers" among cucumber, potato, tobacco and tomato viruses. There is much new information about the behaviour of viruses *in vitro*. The electron microscope has told us something of their morphology as they exist outside the plant host. On what might be called the physiology of infection there is little new fundamental knowledge, and we know practically nothing about how viruses produce their characteristic effects on their hosts or what makes one variety resistant and another susceptible. The great value of this book is that it provides both a detailed picture and a panorama of present-day knowledge on plant viruses. The different methods of studying them are described with precise attention to detail, but the perspective is so good that one can distinguish both "wood" and "trees". A.F.P.

1191. BÖHM, L.

*Snůška s ovocných stromů. (Pollen collection from fruit trees.)*

*Rádce Zemědělece* 101, 1948, pp. 99, illus., Kčs 30.

This descriptive practical handbook is based on articles by F. Wegmann in *Schweizerische Bienenzeitung* which have been adapted to suit Czech conditions. Where Wegmann's ideas and recommendations differ considerably from those practised in Czechoslovakia their trial is suggested. Fruit blossom, being the first source of nectar and pollen in the spring, is of decisive importance to beekeepers. The fruit grower in turn depends on the presence of strong healthy bees in the spring. To achieve this, adequate autumn preparation for the "dormant" season is essential, and this is very often made difficult by lack of flowers at that season. The author goes so far as to regret the use of chemical weedkillers, weeds being in some cases the only source of late pollen.

1192. DALMASSO, G.

*Problemi di viticoltura moderna. (Problems of modern viticulture.)*

Casa Editrice Ambrosiana, Milan, 1947, 8½ × 6 in., pp. 282, bibl. extensive, 900 lire.

This is a reference book, without illustrations and with



paper covers, on vines and viticulture for Italian horticulturists and for others interested in growing vines who can read Italian. It comprises 11 chapters covering the following subjects: an ampelographical introduction (*Vitis vinifera* and its subspecies, and a review of modern problems in viticulture); genetics; the phylloxera problem; grafting and the adaptation of the rootstock to the soil (particularly with reference to chlorosis); the flowers (morphology, pollination, parthenocarp, etc.); choice of varieties; table grapes; copper compounds for the control of downy mildew; control of powdery mildew; and leaf curl (court-noué). Each chapter has its bibliography, over 300 references in all.

## 1193. DOIDGE, E. M.

**The South African fungi and lichens to the end of 1945.**

*Bothalia*, 1950, 5, 9½ × 7 in., pp. 1094, bibl. extensive, illus., 30s.

The serious study of mycology in South Africa started with the appointment, in 1905, of I. B. Pole Evans as mycologist in the Transvaal Department of Agriculture. Records of South African fungi have been continued by other workers, particularly P. A. van der Byl and by Dr. Ethel Doidge herself. These records have now been brought together in this large volume of over 1,000 pages, which is an important addition to the world's mycological literature. Many of the fungi included have a special mycological interest because of their unusual structure or their physiological relations with their substrata. Horticulturists will be interested in the records of those fungi which attack subtropical fruit trees; lists of fungi found on *Citrus* spp. are on pp. 864-8, and 17 fungi on *Persea americana* (avocado) on p. 829. It will prove a useful book of reference for horticulturists and plant pathologists, particularly with regard to the distribution of the fungous parasites of crop plants. H.W.

## 1194. EBELING, W.

**Subtropical entomology.**

Lithotype Process Co., San Francisco, Calif., U.S.A., 1949, 11 × 7½ in., pp. 747, bibl. 1032, figs. 570, \$7.50.

This work is the outcome of the teaching experiences of Professor Walter Ebeling, entomologist in the Experimental Station, University of California, Los Angeles. The book is divided into twenty-eight chapters which relate in some detail all the aspects of economic entomology, with special reference to the sub-tropical fruits, of which citrus is by far the most important. The early chapters treat of morphology, metamorphosis, classification, organization and legislation, artificial control, insecticides, and biological control. Eleven chapters are devoted to the pests of specific sub-tropical crops, special attention being given to those of citrus, one chapter describing the pests of this crop in the U.S. and another the major pests found in other countries. Other fruits of which the pests are described, in one chapter to each crop, are grape, walnut, almond, pecan, fig, olive, avocado, and date, with another chapter on the pests of minor sub-tropical fruits (pomegranate, persimmon, mango, papaya, macadamia nut, loquat, cherimoya). The pests are discussed in the order of their phylogenetic relationships, starting with the lower phyla, i.e. nematodes and

mites, and then the insects in ascending evolutionary status. Reference is made to the sub-tropical fruits and their pests in different parts of the world, but special attention is paid to the Californian species.

It is indeed refreshing to find that the text is fully up to date; for example, the organic phosphates (tetra-ethyl pyrophosphate and parathion) are referred to in relation to the latest measures of control. Also the fumigation story, a very important aspect of citrus scale control, is discussed clearly and in considerable detail. Another pleasing aspect of the work is the very thorough manner in which the mites and other lesser orders are discussed, and it is evident that the author is master of the subject he has set out to present to his public.

The book is well illustrated, care having been taken to select the most suitable photographs for the purpose. The bibliography is also very comprehensive. It can be stated quite truthfully that this is not just another book on entomology, but a very important contribution to the literature of the pests of sub-tropical fruits, and will be welcomed by all economic entomologists whether they are concerned with citrus pests or not. In due time it will be regarded as a standard work on the subject. A.M.M.

## 1195. EISELT, M., AND KRÜSSMANN, G.

**Die Freiland-Schmuckstauden. I. Anzucht und Kultur. (Perennials for the garden. I. Propagation.)**

*Grundlagen u. Fortschritte im Garten- u. Weinbau*, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, Heft 74, 8½ × 6 in., pp. 76, illus., DM. 2.90.

JELITTO, C. R.

**Die Freiland-Schmuckstauden. II. Acaena bis Azorella. (Perennials for the garden. II. Acaena to Azorella.)**

*Ibidem*, 1950, Heft 78, 8½ × 6 in., pp. 81, illus., DM. 3.20.

SCHACHT, W.

**Die Freiland-Schmuckstauden. III. Baptisia bis Dryopteris. (Perennials for the garden. III. Baptisia to Dryopteris.)**

*Ibidem*, 1950, Heft 82, 8½ × 6 in., pp. 104, illus., DM. 4.20.

When the series is complete—it is planned to comprise 10 short volumes—a substantial work of reference on the growing of out-door perennials will be available to the nurseryman and amateur horticulturist. No. I, which serves as a general introduction, deals with various methods of propagation, including that of water plants, and points out many a short cut. Nos. II and III begin the alphabetical survey of genera cultivated in the gardens of Central Europe, giving descriptions of the more important species and varieties with notes on the time of flowering, cultural value and cultural requirements. Owing to the concise style a great deal of useful information is assembled in these comparatively slender volumes.

## 1196. ERNEHOLM, I.

**Cacao production of South America.**

C. R. Holmqvists Boktryckeri Ab., Göteborg, Sweden, 1948, 9½ × 7 in., pp. 279, bibl. extensive, maps, 43 Kr.\*

\* To students ordering 10 copies direct from the author a discount of 50% is allowed.

The sub-title of this book reads "Historical development and present geographical distribution", and these two aspects of cacao production in South America are considered in two parts of almost equal length.

The historical development of cacao makes an interesting story dating back to the conquest of Mexico by Cortés in the 16th century. At that time cacao was cultivated by the Mayas in the regions now known as Guatemala, Yucatan and British Honduras. Towards the end of that century regular exports of cacao to Spain began, and thereafter the centre of production shifted steadily from Central to South America. During the colonial period the main sources of supply were Venezuela, Ecuador, Brazil, the Guianas and Colombia. From the close of the colonial period between 1822 and 1830 onwards more detailed information became available on the extent of production and exports, and separate chapters are devoted to the development of the industry in each of the main producing countries, Brazil, Ecuador and Venezuela, and another chapter to the minor producers. Much of this section consists of statistics of production, exports and values, supplemented by tables and graphs, but Dr. Erneholt succeeds in sustaining interest in the narrative and in indicating the underlying causes of expansions and declines. The most spectacular change has occurred since 1890 in Brazil, where, through the development of the province of Bahia, exports have risen from about 5,000 tons a year to over 100,000, making Brazil second only to the Gold Coast as a producer of cacao. Relative to world production as a whole, however, the position of South America has declined. The first decisive factor was the greatly increased demand for cheap, as opposed to fine, cacao. Among the main South American producers only Bahia and to a lesser extent Ecuador attempted to cater for this new demand, and some progress made by the latter in the early part of the present century has been more than offset by the ravages of the dreaded Escoba de Bruja or witches' broom disease. To-day few areas apart from Bahia appear to be free from this disease, which must be regarded as the major limiting factor to an extension of cultivation in most regions.

The second part of the book, on the present geographical distribution of cacao, contains three chapters devoted to each of the main producing countries, Brazil, Ecuador and Venezuela, a fourth to the minor producing countries and a fifth to the areas of South America that are potentially suited to an extension of cacao cultivation. For each country a brief survey is given of its geology and surface configuration and its temperature and rainfall conditions, the text in each case being fully supported by maps. Notes follow on the characteristics of the main areas of production within each country, and for some areas information on altitudes, soils and yields is given. In the final chapter on potential new areas of cacao cultivation particular attention is paid first to the low temperature limit for production and associated with this the maximum altitude, secondly to the intensity and duration of dry seasons, and thirdly to the distribution of witches' broom disease. A map is supplied showing areas that would be suitable if rainfall were supplemented by irrigation, areas that would be suitable without irrigation but are subject to the risk of infection by witches' broom, and lastly areas that would not need irrigation

and are not infected by witches' broom. It is noteworthy that the last named form a very small proportion of the whole.

It is perhaps inevitable in a book of this nature that only limited attention could be paid to the purely agricultural aspects of cacao production. Type of cacao, soils, irrigation and yields are described in some cases, but the picture that emerges is not comprehensive; such factors as spacing, shade and cultural practices, related as they must be to environmental conditions and to yields, are hardly mentioned. Nevertheless, Dr. Erneholt has done an excellent job within the limits he has set himself, and the data he has assembled and set out in such a readable form will be of value and interest throughout tropical countries where cacao is grown or where new areas are being surveyed for prospective development. A historical and geographical study such as this makes an excellent foundation for a more detailed ecological study of a crop, and it is to be hoped that the enterprise shown in producing this book will encourage the production of similar surveys devoted to the other major tropical crops.

G.K.A.

#### 1197. FARADAY SOCIETY.

*The interaction of water and porous materials: general discussion of the Faraday Society No. 3.*

Gurney & Jackson, London, 1948, 10 × 8 in., pp. 294, 30s. [received 1950].

This book consists of a collection of 31 papers in 4 sections, each section being followed by a discussion. The first 12 papers discuss the physical concepts fundamental to the movement of water over and through inanimate objects, rough surfaces, capillary tubes, powders, etc. The second section of 7 papers (see separate abstracts) describes the problems involved in understanding the movement of solutions, and of water in the plant. The zoological aspects dealt with in the next 7 papers discuss the structure and behaviour of the insect cuticle with respect to its waterproofing and water-protecting properties and its permeability. The final section deals, in 5 papers, with the problems involved in describing the permeability to water and water vapour of textiles and other fibrous material such as leather, wood and woven materials. Many papers in the first section become highly mathematical and illustrate the difficulty of the problems put to the physical chemists by the botanists and zoologists in the succeeding sections. The whole discussion gives a clear indication of the understanding so far attained of the relations existing between liquid and solid surfaces.

F.W.M.L.

#### 1198. FOSTER, J. W.

*Chemical activities of fungi.*

Academic Press Inc., New York, 1949, 9 × 6 in., pp. xviii+648, bibls. extensive, 9.50 or £3 16s.

Although this book has no direct interest for the horticulturist, it must be remembered that many fungi play an important part in ameliorating soil conditions, and others cause serious diseases of crop plants. The chemical activities associated with the physiological processes underlying the adaptation of fungi to their environment thus have agricultural and horticultural



significance and indicate the importance of a book of this nature.

1199. KALSHOVEN, L. G. E.

*De plagen van de cultuurgewassen in Indonesië. Deel I. (Crop pests in Indonesia. Part I.)*

W. van Hoeve, The Hague, 1950, 9½ × 6¼ in., 8 + 512 pp., bibls. extensive, illus., Fl. 33.75.

This is a comprehensive monograph of the pests of plants and plant products, and their natural enemies, in Indonesia. Compiled largely from numerous observations recorded at the experimental stations in that region, it is arranged systematically and is to be in two volumes. This, the first, comprises sections on the Annelida (worms), with a chapter on plant-infesting eelworms by J. van der Vecht, the Mollusca, and Arthropods, except some of the Lepidoptera, Coleoptera, Hymenoptera and Diptera, which, with the birds and mammals, will be included in the second volume. It describes their morphology, distribution, bionomics, food-plants, or other food, economic importance, control (their natural enemies being mentioned), and the plant diseases they transmit. Each section has a bibliography. The excellent photographs, the beautifully executed drawings and the 8 striking coloured plates are important features. H.W.

1200. LAIBACH, F., AND FISCHNICH, O.

*Pflanzen-Wuchsstoffe in ihrer Bedeutung für Gartenbau, Land- und Forstwirtschaft. (Plant growth substances in horticulture, agriculture and silviculture.)*

*Grundlagen u. Fortschritte im Garten- u. Weinbau*, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, Heft 81, 8½ × 6 in., pp. 80, bibl. in text, illus., DM. 3.60.

In view of the many recent reviews in English on the subject, this up-to-date survey on the application of growth substances to horticulture and agriculture would appeal primarily to German readers.

1201. MARGGRAF, M., AND HARTMANN, G.

*Das Chrysanthemum; sein Formenreich-tum und seine Kultur. (The chrysanthemum; its polymorphism and culture.)*

*Grundlagen u. Fortschritte im Garten- u. Weinbau*, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 4th edition, 1950, Heft 11, 8½ × 6 in., pp. 72, illus., DM. 2.80.

The senior author, who is responsible for the first 3 editions of this book, had made the horticultural research station, Geisenheim-on-Rhine, a Mecca for all German chrysanthemum lovers. There he grew and tested all promising new varieties collected from all over Europe. In 1944 the collection was destroyed and Marggraf lost his life. The 4th edition was brought up to date by Hartmann, for 15 years a close associate of Marggraf's. The book deals competently with all types of chrysanthemum, their propagation and cultural requirements, as well as their diseases and pests. The final chapter (10 pages) is devoted to a brief tabulated description of selected, well tested varieties. V.H.G.

1202. METCALFE, C. R., AND CHALK, L.

*Anatomy of the dicotyledons.*

Clarendon Press, Oxford, 2 vols., 1950, 9½ × 6 in., pp. 1,500, bibls. extensive, illus., £6 6s.

These two large volumes describe the anatomy of dicotyledons, considered chiefly in relation to taxonomy, but with notes on the economic uses of important representatives of particular genera. In mentioning the practical reasons for using anatomical characters the authors say, "The taxonomic value of cytological and genetical studies lies chiefly in the interpretation of species and groups of lower rank. Anatomical structure, on the other hand, is most likely to provide evidence concerning the inter-relationships of larger groups such as families, or in helping to establish the real affinities of genera of uncertain taxonomic status." Vol. I contains the Introduction, discussing anatomy and taxonomy, anatomy and phylogeny, selection and preparation of material, followed by anatomical descriptions of families Ranunculaceae to Umbelliferae. Vol. II continues with families Araliaceae to Ceratophyllaceae, then with lists of families in which certain diagnostic features occur, an appendix showing the distribution of cell dimensions, etc., in dicotyledonous woods, and an extensive bibliography. The book would appear to have no direct horticultural significance but many crop plants are mentioned here, and a consideration of their normal anatomy is important when abnormalities set up by cultural operations (pruning, grafting), by infectious diseases and by nutritional disorders are being studied. H.W.

1203. NAIK, K. C., AND GANGOLLY, S. R.

*A monograph on classification and nomenclature of South Indian mangoes.*

Superintendent, Government Press, Madras, 1950, 10 × 6 in., pp. 311, bibl. 111, illus.

The mango, cultivated in India from time immemorial, is the most important commercial fruit in that country. Madras is one of the main areas of production, and it is estimated that in the province some 250,000 acres are occupied by the crop. Innumerable varieties, varying widely in the type and quality of their fruits, have been grown, some restricted to small localities, others distributed widespread but under different names in different regions.

In the absence of any comprehensive system for classifying and describing varieties confusion was bound to continue, and progress in the improvement of the crop was inevitably retarded. Realizing this, the Madras Government in 1937 sanctioned a scheme for preparing a classification of the varieties found in South India, and the present monograph is the outcome of eight years' work carried out under that scheme.

The authors discovered at the outset that existing descriptive methods applied to mangoes were neither sufficiently comprehensive nor sufficiently uniform to provide the basis for a complete classification. Before describing the key they have evolved for the identification of varieties, they therefore devote several chapters to the various factors that had to be considered, namely the material available, the descriptive methods to be employed, and the diagnostic importance of morphological characters, which they discuss in the light of experience obtained with other fruits.

In the key itself the characteristics of the fruit, foliage and inflorescence are divided into primary, secondary and tertiary characters. As primary characters they have taken, first, the form of the fruit in which they recognize three main groups, and, secondly, the form of the beak in which two main groups are recognized; the combination of these characters thus gives rise to six main groups or cohorts in all. As secondary characters they have taken the form of the leaf apex (two groups) and the nature of the folding of the leaf (two groups). Tertiary characters used are the shape of the inflorescence (three groups), the shape of the leaves (three groups), the type of venation of the stone, the amount and nature of the fibre on the stone, the shape of the fruit shoulders, the nature of the fruit sinus and lastly the coloration of the emerging leaves.

The key is followed by individual descriptions of 335 varieties grouped according to the four classes based on secondary characters within each cohort. Apart from the basic characters covered by the key, notes are supplied on synonyms, tree size and shape, inflorescence, fruit and stone characters, fruit quality, yield, season of cropping and keeping quality, and resistance to wind and hoppers. Each description is accompanied by a diagram of the fruit and stone.

The authors recognize that not everyone is likely to agree with the form of classification they have adopted, and they admit that revision will be needed from time to time as more knowledge is accumulated of the group of plants being studied. They claim, however, that their system meets the needs of the situation as it exists to-day in South India, and urge that a similar effort be now made to classify the mango varieties in other parts of the country. The fact that their system has made it possible to arrange and describe more than 300 varieties over a comparatively large area suggests that it provides a sound working basis. The final verdict on their methods must await their application to the same and other varieties grown in other regions under widely varying conditions of climate, soil, and perhaps also of rootstock. It is to be hoped, therefore, that this book will be widely circulated and the methods used applied in other countries where mangoes are grown.

The authors have obviously done an immense amount of work and have on the whole set out their case clearly and in language sufficiently simple to be appreciated by a much wider circle than that limited to the systematic botanists. A less satisfactory feature is the rather inferior paper used, and the uninspired cover and printing so typical of many Government publications. The illustrations and diagrams, though they appear to be basically good, also suffer in their reproduction.

G.K.A.

1204. ROBBINS, W. W., AND WEIER, T. E.  
*Botany: an introduction to plant science.*  
 John Wiley & Sons, Inc., New York;  
 Chapman & Hall Ltd., London, 1950,  
 10×7 in., pp. ix+480, figs. 490, 40s.

The authors of this book are professors of botany at the College of Agriculture in the University of California. Their general aim is indicated in the preface in these words: "The authors have endeavoured to give the student a modest understanding of the scope of botany and its relation to agriculture, forestry, and

medicine and to other physical sciences; to point out what botany has contributed to our knowledge of the world in which we live; to stress the all-important role of plants in the economy of nature; in short to arouse interest and to process the student's thinking so that he has a feeling that the course of study has significance to him and is related to his everyday life." The book deals first (Chapter 1: Introduction) with the plant world in general, showing the importance of plants to man's existence and emphasizing that agriculture is a basic industry. One section shows the interrelation of botany and other sciences (particularly chemistry), and another discusses what a botanist is and what he does. In Chapter 2 is a brief review of the world's plants in relation to their distribution and their uses for providing food, for industrial purposes, and in medicine, with references to plants that provide spices and beverages, ornamental plants and those that are harmful, either directly to man because of their poisonous properties, or as weeds that lower the value of his crops.

Then follow chapters on types of vegetation, classification and naming of plants, their various organs and their functions, reproduction, genetics, and an account of the main divisions of the plant kingdom with illustrated descriptions of selected examples. The fungi are dealt with at some length, in two chapters, particularly with reference to the losses they cause to crop plants. The viruses are described, in Chapter 18, with electron photographs, and with other illustrations to show some of the disease symptoms they cause in plants. The student is introduced to hormones, vitamins, antibiotics, genes and polyploidy (but not heterosis), all subjects absent from the botany textbooks of the reviewer's early student days.

The writing is as simple as possible; botanical terms are not avoided, since the student must become acquainted with them, but they are described clearly and, where relevant, illustrated. Perhaps this simplification is exaggerated sometimes, and we find "pith" and "pith rays" where "medulla" and "medullary rays" (not difficult words) would commonly be used. A double-column format and the well-spaced type ensure easy reading. The 490 illustrations have the parts clearly indicated, and a review of them will enable the student to revise quickly the salient points of the text, without necessarily referring to the text itself. Many of the illustrations have been reproduced from monographic treatises and their origin is acknowledged, but there is no "bibliography" to enable the student to see the scope (and possibly the price) of a book he may wish to see, or acquire, in order to study more closely a particular sideline which interests him.

Some of the photomicrographs of the phases in nuclear division (Figs. 5.16; 5.18; 5.22) are not very clear and the young botanist may wonder how the stages so precisely set out in the diagrams can be deduced from such preparations. There is a slip in the diagram showing the life cycle of the brown rot fungus (Fig. 17.15): the conidial stage shown is *Botrytis*, not *Monilia* which is the conidial stage of the brown rot fungus. These defects, however, detract but little from the value of a book so admirably designed to enable the reader (be he student of botany, agriculture or horticulture, or the interested amateur) to understand what the study of botany means in the world



to-day. Because of its size it is not a convenient handbook, and its price precludes its popularity among English students, but it will be a welcome addition to any botanical library to which students have ready access. H.W.

## 1205. SMITH, G.

*Organic surface cultivation.*

Ward, Lock & Co. Ltd., 1950, 8×5 in., pp. 192, illus., 7s. 6d.

For the benefit of the uninitiated, organic surface cultivation is a method of growing plants in a few inches of properly prepared compost mulch over undug soil, the mulch being applied once or twice every year. The author has been experimenting with this method for a couple of years, mainly on half an acre of light virgin soil in the New Forest, and claims that, by applying "Nature's" methods, the fertility of the soil will be raised far above that of dug soil treated with inorganic fertilizers, excellent crops of flowers, fruit and vegetables can be produced, the plants will become so resistant to pests and diseases that spraying will be unnecessary and, further, that they may well impart disease resistance to the consumer.

His method is attractive, especially to the private gardener with little inclination for digging and few facilities for spraying. The arguments, however, would carry more weight were not many of the scientific facts oversimplified, were not teleological explanations too often given, were not the practices of good gardeners of the "digging" school misrepresented (they do not, for instance, bury manure at a depth at which it cannot decompose and cannot be reached by the plant), and were not the whole impregnated with vituperation and abuse of scientists and "authoritative persons", as being bigoted and "egged on" by financially interested fertilizer firms. The following sentence may be cited as one of many instances: "The late Sir Albert Howard was . . . a man of broad outlook, the only one so far sufficiently able to make some headway against the armies of detail scientists who are so ably supported by financial interest." Even the most open-minded reader must feel a sense of distrust.

The use of artificial fertilizers is condemned as being detrimental to the welfare of soil organisms; on lawns, for instance, hormone weedkillers are advocated in preference to lawn sand or sulphate of ammonia, although it is admitted that no one has yet investigated the effect of growth substances on the soil population. Spraying is also condemned for the same reason and because it disturbs the balance of nature; sound arguments, but one loses confidence when it is suggested that aphid-infested black currant shoots may be dipped into a can of derris wash, without spilling any on the soil, provided any ladybirds present are shaken off before the dipping.

It is only fair to note that the book is written exclusively for the amateur gardener, and, indeed, the amateur gardener may find here some useful hints on a variety of subjects, including pruning neglected fruit trees and making a compost heap, as well as some very amusing remarks on the design of a garden.

It is a pity, however, that the case for organic surface cultivation has been pleaded with so much fury on such slight evidence. It may well have a good case, but scientifically valid results are still needed to prove it.

It would be an advantage if, in a second edition, the photographs were numbered for reference purposes.

P.R.-D.

## 1206. SMOCK, R. M., AND NEUBERT, A. M.

*Apples and apple products.*

Interscience Publishers Ltd., New York and London, 1950, 8½×5½ in., pp. xvi+486, bibl. 906, illus., 60s.

This book is the second in a series of monographs on the chemistry, physiology and technology of economic food crops,\* and is designed to give a systematic survey of the factors causing variation in the chemical composition and biochemical behaviour of the apple. It is intended as a textbook and book of reference for those interested in the handling, storage and processing of the apple, both horticulturists and technologists, but does not claim to serve those concerned with the production of the fruit.

The first nine chapters cover such subjects as the distribution of the apple, the development of the fruit, the effect of environmental and cultural factors on its chemical composition and physiology, chemical changes and physiology of the fruit on the tree and after harvest, pre-storage treatments and storage. The subjects are dealt with somewhat uncritically, fundamental principles generally not being discussed. Information on varieties, pests and diseases, handling and storage is based mainly on American practice and American research work.

The second half of the book covers problems associated with the manufacture of apple products, and provides an up-to-date comprehensive account of the subject, illustrated by clear, well-chosen diagrams. The extensive bibliography, presented in the form of footnotes but numbered consecutively, makes the book of value for reference purposes.

P.R.-D.

## 1207. TANTAU, M., AND WEINHAUSEN, K.

*Die Rose, ihre Kultur und Verwendung. (The rose, its culture and uses.)*

*Grundlagen u. Fortschritte im Garten- u. Weinbau*, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, Heft 61, 8½×6 in., pp. 100, bibl. 33, illus., DM. 3.—.

*JELITTO, L., AND PFITZER, P. Dahlien im Garten und im Haus. (Dahlias in the garden and in the house.)*

*Ibidem*, 2nd edition, 1950, Heft 65, 8½×6 in., pp. 91, illus., DM. 4.20.

*RICHTER, W.**Anzucht und Kultur der Bromeliaceen mit besonderer Berücksichtigung der für den Handel wichtigsten Arten. (Propagation and cultivation of Bromeliaceae with special reference to species of commercial importance.)*

*Ibidem*, 1950, Heft 76, 8½×6 in., pp. 84, bibl. 7, illus., DM. 3.80.

According to the tradition of this well-established series the cultivation of the plants indicated in the three titles is described by experts in all its aspects as a guide to the intelligent grower and amateur. The limitation of each of the treatises to one genus or one family makes it possible to deal satisfactorily with points of

\* For a review of the first book in this series, *Bananas* by H. W. von Loesecke, see *H.A.*, 20: 3402.

historical, botanical and practical interest, the emphasis being decidedly on the last. The books are readable and are sure to be appreciated by a wide section of the horticultural public.

1208. VOGEL, F.

Obstbaumdüngung mit praktischen Beispielen. (The manuring of fruit trees.)

Grundlagen u. Fortschritte im Garten- u. Weinbau, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, Heft 80, 8½ × 6 in., pp. 115, illus., DM. 2.85.

Books of this type do not attempt to propound new theories, but in addressing themselves to growers and giving expression to the most advanced current opinion of their country, they reflect the structure of its fruit industry. It is therefore not without significance that only 3 pages are devoted to manuring in orchards proper and 8 pages to trees growing in pastures or meadows, a characteristic feature of the peasant farm in many parts of Central Europe. Neither is it surprising that the discussion on organic manuring—to which the author attaches the greatest importance—should contain only one brief reference to the foreign practice of mulching with grass and none to green manuring, while the application of liquid manure (chiefly cattle urine) is treated at length. The injection of liquid fertilizer into the soil is also given prominence; it is recommended not only for trees under grass but also for those under cultivation to offset the damage caused to the roots by cultivating to a depth of 20 cm. The argument in favour of this method is that phosphates and potash are stored in the top layer of the soil, whereas nitrogen leaches much more quickly into the uninjured root zone. Hence, the nutrient balance is disturbed unless all three elements are made available to the tree at the same time. The English reader is likely to benefit most from the appendix of 33 pages, which can be profitably studied with only a slight knowledge of the German language. Here the author indicates the dosages and composition of fertilizers to be applied to fruit trees of all ages and growing under a variety of conditions. The value of the illustrations is enhanced by fully explanatory captions. V.H.G.

1209. WAKEFIELD, E. M., and DENNIS, R. W. G.  
*Common British fungi.*

P. R. Gawthorn, London, 1950, 10 × 6 in., pp. 290, illus., 35s.

During the war years interest in toadstools was roused because the public came to realize that not only the mushroom but other fungi also, some comparatively common, were edible, nutritious and palatable. The book under review not only describes edible and poisonous forms, but aims at popularizing the study of fungi as a branch of field botany. Miss Wakefield has a world-wide reputation as a mycologist, particularly from her extensive knowledge of the British fungi, and she and Dr. Dennis now publish an account of some of these fungi in a volume with the sub-title: "A guide to the more common larger Basidiomycetes of the British Isles", which indicates its scope. Its aim is "to provide simple but accurate descriptions and adequate illustrations of some 470 common or striking British Basidiomycetes—that is, of mushrooms and toadstools, bracket fungi, coral fungi, puff-balls and their allies". Some of these fungi are, of course,

well-known parasites of fruit trees, so that this book will serve as a reference book for their identification in doubtful cases. It is illustrated with 111 excellent coloured plates (each showing several species) and 6 text figures. It fills an important place in our British botanical literature. H.W.

## Reports.

1210. AGRICULTURAL LAND COMMISSION.

*Romney Marsh Investigation Report.*

H.M. Stationery Office, 1949, pp. 39, maps, 2s.

The report of the Agricultural Land Commission, established under the Agriculture Act 1947, on an investigation into the agricultural use of Romney Marsh includes among its recommendations the following statement: "Ley farming is the proper system for general adoption in Romney Marsh to ensure full and efficient use of the land for agriculture; although intensive arable farming and market gardening should not be discouraged where conditions are suitable." As regards choice of crops, the Marsh soils are particularly suitable for wheat and potatoes.

1211. AMSTERDAM, ROYAL INSTITUTE FOR THE INDIES.

*Inlichtingen en onderzoeken van de afdeling tropische producten in 1948 [and] 1949. (Information and research of the Tropical Products Laboratory. Annual reports for 1948 and 1949.)* [English summaries 4 pp. and 5½ pp. respectively], 1949, pp. 61, and 1950, pp. 59 respectively, illus., f. 3 each.

The work reported includes investigations into the manufacture of essential oils, drugs and tea, the fat content of palm fruits, insect pests of palm seeds, methods for the determination of rotenone, control of the 4-spotted bean weevil with derris, and the production of fibres from *Aloe*, coconut and ramie. A fuller account of some of this work has been abstracted elsewhere in this number [see abstract 1081].

1212. BALSÅRD (GRANHALL, I.).

*Föreningen för växtförädling av fruktträd. Verksamhetsåret 1949. (Annual Report of the Society for Fruit Tree Breeding, Balsgård, for 1949),* 1950, pp. 23.

Activities discussed include new crosses in top fruit on a large scale, selection of material raised in former years, selection of apple rootstock clones and the induction of mutations in fruit trees by treatment with X-rays and neutrons. Finally, a survey is presented of the breeding work carried out on apples, pears, plums, cherries and hazel nuts during the period 1943-48.

1213. BUNDESANSTALT FÜR ALPINE LANDWIRTSCHAFT, ADMONT, AUSTRIA (ZELLER, A.).  
*Bericht über die Tätigkeit der Bundesanstalt für alpine Landwirtschaft in Admont im Jahre 1948. (Report of the Austrian institute for alpine agriculture at Admont for 1948.)*

*Veröff. Bundesanst. alpine Landw. Admont,* 1950, Heft 3, pp. 1-97.

The items reported on include: (1) Potato variety



trials (pp. 41-9) with tabulated descriptions of the flower and of the sprouts (germinated in light) and with detailed data on diseases, yield, etc. (2) Vegetable trials (pp. 57-83) carried out at altitudes of 640, 1,150, 1,350 and 1,750 m. Varieties of the more common vegetables were tested and data are presented on time of sowing or planting, length of growing season, quality, bolting, etc. Winter hardiness and the effect of altitude on quality are among other subjects discussed. Varieties grown locally in alpine districts proved to be no better adapted to the climatic conditions of the experimental area than standard varieties.

1214. CAWTHRON INSTITUTE.

*Annual Report of the Cawthron Institute, New Zealand, 1949-50*, Nelson, 1950, pp. 46.

The following work is of special horticultural interest. *Soil investigations.* The survey of tobacco soils in Waimea county has been completed. The data compiled during the survey suggest that it would be unwise to increase the annual acreage of flue-cured tobacco in that county beyond 6,000 acres. Chemical examinations made of hop and raspberry soils in the Nelson district showed these to vary in water-soluble boron content from 0.08 to 0.55 p.p.m., gardens affected with "die-back" having the lowest boron content of 0.08-0.22 p.p.m. *Plant nutrition.* A study of the boron content of raspberry leaves obtained from different parts of New Zealand showed that the average boron content of samples collected outside the Nelson district was 58.5 p.p.m., while that of samples from the Nelson district was 29.3 p.p.m.; leaves from gardens badly affected with "die-back" contained only 20-25 p.p.m. The Zn, Cu and Mn contents of the samples varied greatly. From a study of the nutrient intake of glasshouse tomato plants, it is estimated that a 60-ton crop under Nelson conditions of culture would require not less than 523 lb. superphosphate, 970 lb. sulphate of potash and 1,125 lb. sulphate of ammonia. A study was made of the nitrogen and mineral status of hops on several soils at Nelson. *Fruit research.* No benefit was derived from dormant zinc sulphate sprays applied to apple and cherry trees suspected of zinc deficiency, and leaf analyses suggested that the zinc status of apple trees in the Nelson district was satisfactory. The value of borax in controlling "die-back" of raspberries has been confirmed. The Stateman apple variety has continued to give better yields on Double Vigour stock (French Crab vegetatively propagated) than on Northern Spy. An Epp's Seedling stock induced more vigorous growth in Jonathan and Cox's Orange than did Northern Spy; moreover, in the case of Jonathan the yield was higher. *Tomato research.* The effect of various soil disinfectants on the yield and quality of glasshouse tomatoes was studied. Steaming resulted in the highest yields and excellent growth; Sterizal resulted in poor yield, growth and quality; the quality of the fruit was best in the unsterilized and chloropicrin-treated plots. Further tests are reported on the value of compost, sawdust and cocoa bean husks in the treatment of glasshouse soils. The amount of "hard-core" in tomatoes was greatly reduced by dressings of 1 or 2 tons muriate of potash per acre, used in conjunction with standard fertilizer, and by soil treatment with chloropicrin. *Hop research.* Disease

surveys in the Nelson district showed that the most common disease was black root-rot (*Phytophthora* sp.). Field trials on the value of DD, chloropicrin and calcium cyanamide, and of heavy dressings of potash for the control of this disease are in progress. The results of variety trials confirm the experience of growers concerning the resistance of the Fuggle and Bumford varieties to black root-rot and the susceptibility of the Grape and Californian varieties. *Tobacco research.* Chemical investigations included the effects of boron, lime, different forms of nitrogen, magnesium, the major plant foods, mosaic infection, green manuring, spacing and topping on the chemical composition of the leaf. Disease investigations included disease surveys of tobacco seedbeds and commercial gardens, and work on the control of verticillium wilt, sclerotinia rot and mosaic. *Entomological investigations.* The parasite of the green vegetable bug has become established in at least one locality in North Auckland. Damage by the tobacco leaf miner was checked by DDT dusting; the life history and ecology of the insect is being studied, and a parasite has been liberated. Distribution of the *Chrysolina* beetle for control of St. John's Wort is being continued.

1215. CENTRAL EXPERIMENTAL FARM, OTTAWA.

*Progress Report Division of Field Husbandry, Soils and Agricultural Engineering, Central Experimental Farm, Ottawa, 1936-1948*, 1950, pp. 125, illus.

This report is primarily of interest to the farmer rather than the horticulturist, and contains information on meteorology, soil surveys, soil fertility investigations, rotations, cultural experiments, weed control, etc. Considerable space is devoted to agricultural engineering, and among the implements that have been tested are mounted row-crop cultivators and potato and nursery stock hillers (bankers), rotary tillers and weeders, a tobacco transplanter, apparatus for subsoil fertilizer applications in orchards and equipment for spraying weeds, orchards and potatoes. The use of a low pressure fibre conduit for carrying irrigation water to vegetables has been studied.

1216. CENTRAL EXPERIMENTAL FARM, OTTAWA.

*Progress Report Division of Horticulture, Central Experimental Farm, Ottawa, 1934-1948*, 1950, pp. 259, bibls., illus.

A comprehensive report is given on research over 15 years. Separate abstracts are given on some of the projects [abstract numbers 124 and 201] and it is only possible to mention the remainder briefly as follows: *Pomology:* Studies are reported on winter injury, the use of hardy intermediates in frame working and apple rootstocks including seedlings and hardy clonal rootstocks. [For another account of this work see abstract 161.] *Fruit variety trials* with pears, plums, apricots, strawberries, raspberries, grapes, gooseberries and red currants are described. *Native fruits:* One of the newer projects involves cultural trials with blueberries, cranberries and elderberries in the Maritimes. *Vegetable crops:* Breeding work with asparagus, beans, beets, carrots, sweet corn, onions, peas, spinach and tomatoes; seed production and variety trials; a comparison of 3 sweet Spanish onion strains;

a comparison between pelleted and unpelleted seeds; and a brief note on chemical weed control. *Potato investigations*: Storage of potatoes in CO<sub>2</sub> and O<sub>2</sub> gas mixtures had some effect on delaying sprouting, but the work was discontinued as having no practical application; chemical inhibition was found detrimental to seed potatoes. Results of tests with "Phytergine", a French proprietary brand of growth hormone, showed it to have a depressing effect on both growth and yield of potatoes. *Ornamentals*: Notes are included on *Lilium* hybrids, *Iris sibirica* hybrids, *Rosa*, *Syringa* and *Malus* hybrids, and storage of Bermuda lily bulbs. Studies are described on carnation, rose, chrysanthemum, aster, poinsettia and snapdragon. *Low temperature research*: The low temperature laboratory and its equipment are described and investigations are reported, particularly for apples, on respiration, gas and ordinary storage, scald, and soluble pectin trends in stored apples. Preliminary results are given on exosmosis of electrolytes as a measure of plant hardness, and the effects of freezing on mature apples. Storage tests with potatoes, celery and root vegetables, and ripening tests with tomatoes are described. *Fruit and vegetable products*. Progress is reported on processing by dehydration, canning and freezing, and on fruit juice production. Reports from the Dominion Experimental Substation, Ste. Clothilde, Quebec, and the Dominion Horticultural Substation, Smithfield, Ontario, are included.

1217. CENTRE DE RECHERCHES DE LA LIGUE POMOLOGIQUE POUR LA DÉFENSE DU FRUIT BELGE.

*Rapp. gén. Centr. Rech. Ligue pomol. Déf. Fruit belge sur les travaux effectués pendant les années 1949-1950. 1<sup>re</sup> partie: Recherches effectuées en 1949.* (General report of the Belgian Fruit League for the years 1949 and 1950. Part I: Work carried out in 1949), pp. 61.

Although it was intended that the report of the Belgian Fruit League should appear biennially, it was thought advisable to publish the results of work carried out during 1949 without delay. No detailed conclusions have been drawn from these preliminary results. The work falls into 2 sections. (1) *Methods of manuring fruit trees*. Orchard trials designed to compare the effects of applying liquid fertilizers by means of a "Pal" injector with those of giving surface applications of dry fertilizers were continued, and at the same time the effects of various rates of application were compared. Detailed results are tabulated but it is considered too early to draw any definite conclusions. The effects of liquid injection were most marked in neglected or recently transplanted orchards. Observations are made on the efficiency of the spraying programme used in these trials in an attempt to eliminate as far as possible the influence of external factors on yield. (2) *Methods of determining the nutritional requirements of fruit trees*. Pot experiments, designed to determine the best method of sampling for chemical analyses, showed that leaves and young roots reflected most clearly the manurial treatment given to the tree. The results of chemical analyses of leaves and fruits taken from a manurial trial plot are tabulated and discussed.

1218. CEYLON RUBBER RESEARCH SCHEME.

*Report of the work of the Rubber Research Board in 1949, 1950*, Colombo, pp. 41.

*Clonal trials*. In a trial of local clones, NAB. 3, 15 and 20 were most promising, while in a trial of imported clones, RRI. 501 and 513 from Malaya have yielded well. AV. 255 and PB. 107 were the next highest yielders. Trials with hand-pollinated seedlings have shown that clones MK. 3/2, WG. 6278 and BS. 3 are promising seed parents. *Propagation*. Trees developed from stumped buddings gave yields similar to those developed from budded stumps. Field buddings, budgrafted 12-16 months after the planting of the budded stumps and stumped buddings, gave a significantly lower yield. No significant girth differences were found between trees developed from buds taken from the main stem and from branches of the parent seedling trees. Main-stem buds are, however, developing corky bark. *Manuring*. In an NPK experiment there were big responses to P but no significant responses to N and K. No significant differences have so far been found in an experiment to compare placement, forking in and broadcasting complete fertilizer mixtures. With backward trees monthly applications of soluble inorganics have been found most effective. *Diseases*. Control of *Oidium heveae* was studied. One resistant variety has been selected and, though it is itself a low yielder, it is hoped that it will be useful in breeding. Sulphur dusting had an adverse effect on the soil. Mist blowers are to be tried out. It has been shown that poisoning old trees does not kill *Fomes lignosus* and that felling, with sale of the timber, is preferable to poisoning when replanting. C.W.S.H.

1219. THE COCOA, CHOCOLATE AND CONFECTIONERY ALLIANCE LTD.

*Report of a Conference on Cocoa held at Grosvenor House, London, 13th and 14th September, 1950.*

Cocoa, Choc. and Confect. Alliance Ltd., London, 1950, pp. 70, illus.

Several papers forming part of the proceedings of this Conference are abstracted separately in the section devoted to cocoa. In addition it may be noted that the paper by Mr. O. J. Voelcker, the former Director of W.A.C.R.I., entitled "West Africa Cacao Research Institute 1944-49" and referred to in *H.A.*, 20: 1983, is reproduced and the main points in it are discussed by his successor, Mr. J. West.

1220. COLORADO.

*62nd Annual Report of the Colorado Agricultural Experiment Station, 1948-49, 1949*, pp. 31.

A brief account is given of manurial experiments involving potatoes, beans, peas, onions, apples and carnations. Weed control trials are in progress on peaches in which a no-cultivation block shows promise; responses of individual weeds, such as bindweed, to 2,4-D have not been consistent. In disease control trials Dithane and two antibiotics were successful in checking carnation root rot. The X-disease of peaches has been transmitted to, and recovered from, two varieties each of plum and apricot. With cherries grafted on two rootstocks no difference in susceptibility was found to the rasp leaf virus. Fumigating stored



onions with nitrogen trichloride gas reduced neck rotting organisms, but had little effect on rots which were in the basal portion of the bulb at harvest time. Pest control studies, in which DDT figured prominently, were made on the lygus bug on peaches, codling moth and clover mite on apples and pears, thrips on onions and aphids on potatoes. Work on the utilization of agricultural wastes included improvements in frozen apple pulp and an apple sherbet made from this product.

1221. D.S.I.R., N.Z.

*Twenty-fourth Annual Report of the Department of Scientific and Industrial Research, New Zealand for 1949-50, 1950,*  
pp. 112, 2s.

Reports from the various branches and research committees of the Department contain the following items of horticultural interest. *Agronomy Division.* 2,4,5-trichlorophenoxyacetic acid applied to the foliage of potatoes during flowering induced dormancy in the tubers but reduced yield and had a deleterious effect on tuber shape. Breeding work and variety trials with vegetable crops are in progress. *Fruit Research Station.* An attempt is being made to diagnose a number of fruit tree diseases suspected of being caused by mineral deficiencies. The reasons for the failure of apple trees on Northern Spy stock to grow successfully in holes formerly occupied by trees on this stock are being investigated. The possibility of reducing frost risk by delaying blossoming of apricots with hormones is being studied. Further experiments in the chemical thinning of apples indicate that practices recommended in other countries must be modified for use in New Zealand conditions, and that the long flowering period typical of New Zealand apples may prevent the general adoption of this practice. Apple rootstock trials are being carried out with vigorous woolly aphis-resistant stocks and cold-resistant Canadian stocks. Three plum stocks from England are being propagated for trial as dwarfing stocks for stone fruit. Further work is being done on the separation of fruit tree viruses from physiological troubles. Tree wound dressings incorporating fungicides and materials intended to stimulate callus formation have resulted in striking improvements in the rate of healing. *Plant Chemistry Laboratory.* A pilot trial on the rate of loss of vitamin C in stored potatoes was carried out, and a full-scale trial in which the effect of variety and locality will be determined is in progress. *Plant Disease Division.* Large-scale trials have confirmed the resistance of the tomato variety Improved Bay State to leaf-mould, and have shown that its yield and quality are equal to, or better than, those of standard New Zealand varieties. Work is reported on tomato canker, root-rot of peas, pea wilt, stem-blight of peas, plum mosaic, bacterial spot of plums, fireblight of apples, bacterial soft rot of carrots, red core of strawberries, and crown gall. Therapeutant testing continues. *Soil Bureau.* Further tests show that the reduction of alkalinity and application of manganese sulphate to the soil does not increase the manganese content of the leaves of peach trees. *Hop Research.* An established hop garden of 8½ acres has been purchased as the headquarters of the Hop Research Station. This station is concentrating mainly on hop

breeding and selection for quality and resistance to disease and on improvement of cultural practices; the Cawthron Institute on identification and chemical control of diseases, together with soil and chemical studies; and the Dominion Laboratory on hop drying practice. *Tobacco Research.* Work included seedbed investigations, fertilizer experiments, studies of the effect of fertilizer and cultural practices on the chemical composition of the leaf, and investigations on mosaic, black root-rot and verticillium wilt. Plant breeding and variety trials are continuing. *Cawthron Institute.* The work of this Institute is also published in a separate Annual Report [see abstract 1214].

1222. FLORIDA.

*Annual Report of Florida Agricultural Experiment Stations for year ending June 30, 1949,* pp. 333, illus.

A very wide field is covered in this report, embracing as it does the condensed individual reports of 10 departments, 4 field laboratories and 8 branch stations. Only a brief mention can be made here of the work in progress that is of interest to horticulturists: *Entomology*, pp. 75-82: The control of pests of pecans, tobacco and woody ornamentals. *Horticulture*, pp. 87-111: In addition to several papers abstracted separately in this number, work is reported on cover cropping and minor elements for pecans, variety and irrigation trials with vegetables, the packing of tomatoes and other vegetables, canning and freezing trials, the culture of camellias, and the nutritional requirements of tung. *Plant Pathology*, pp. 112-17: Damping off of vegetable seedlings, Phomopsis blight and fruit rot of egg plant, camellia diseases, pecan scab and foliage diseases. *Potato investigations laboratory*, pp. 132-40: Variety trials with potatoes, cabbage, cauliflower and sweet corn, the control of downy mildew, alternaria leaf spot and other diseases of cabbage, potato manuring, cultural practices and diseases. *Strawberry investigations laboratory*, pp. 141-2: Variety trials and trials on fertilizers, nematode control, weed control and packing. *Vegetable crops laboratory*, pp. 143-68: The most prolonged and severe drought on record was experienced in the area, only 6 in. rain falling during 8 months. Under these conditions certain insecticides that had proved safe hitherto were phytotoxic. Work is reported on vegetable variety trials, tomato breeding, nutritional disorders in celery, tomatoes and gladiolus, trials with insecticides and organic fungicides, gladiolus variety trials, the control of gladiolus diseases and pests, and the control of nematodes injurious to vegetables. In studies on rapid soil tests for determining soil fertility a new soil sampling tube was developed, and is described briefly with the aid of photographs. *Watermelon and grape investigations laboratory*, pp. 169-71: Control of fusarium wilt and other diseases of watermelons, investigations on grapes. *Central Florida Station*, pp. 172-8: Cercospora blight of celery, caterpillar control on sweet corn, vegetable breeding and variety trials, fertilizer trials with vegetables and nematode control. *Everglades Station*, pp. 179-214: Soil fertility trials with vegetables in the field and under glass, control of vegetable pests, vegetable variety trials, sugar cane moth borer control, sugar cane breeding and agronomic studies, grasses for lawns and other special purposes, and the control of weeds and

pests on golf courses. *Sub-tropical Station*, pp. 244-65: Cultural studies on citrus, avocados, mangoes, guavas, potatoes and tomatoes, the control of potato and tomato diseases and diseases of Tahiti lime, and the control of insects attacking sub-tropical fruits and vegetables [see also separate abstracts]. *Citrus Station*, pp. 269-322: In addition to reports abstracted separately, work is reported on melanose and stem-end rot, the combined control of scale insects and mites, water relations of citrus, studies on the nature, causes and control of citrus decline, the chemistry of insecticides, horticultural machinery, the control of citrus fruit decay, and the processing of citrus products.

1223. INDIAN CENTRAL SUGARCANE COMMITTEE. *Annual Report of the Sugarcane Research Scheme for Madras Presidency at Anakapalle (Vizagatam district) and Gudiyattam (North Arcot district) for 1947-48, 1948, pp. 40 [received 1950.]*

The research scheme reported on here came into operation at Anakapalle and Gudiyattam in April, 1945, the main objectives being the selection of high yielding and useful types of cane and the determination of optimum manurial and cultural schedules for the two districts. Among the experiments reported are: *Variety trials*: Comparisons between varieties planted in March and in June, and yield trials with early and mid-season maturing varieties. A large number of Co. canes are involved. Co.419, the standard variety in most of the trials, has maintained its superiority over 4 other varieties in a trial under swamp conditions. *Manurial trials*: Experiments on the time of application of N, on the optimum doses of N and P for ratoon crops (now in their plant year), and on six levels of N from 0 to 250 lb. N per acre. *Irrigation trial*: Irrigation water was applied at intervals of 6, 12 and 18 days to 2 varieties but so far without any significant differences in yields. *Harvesting and ripening*: A trial to determine the optimum time of harvest is reported, as are studies on juice quality during ripening of varieties in the main variety trials. *Chemistry*: Distinct varietal differences have been found in the percentage N content of approved varieties and in their uptake of N per acre. Analyses of juices at different stages of maturity have shown certain definite trends; for juices to yield good quality jaggeries the desirable characteristics seem to be high P content, low glucose, low organic non-sugars and a low organic non-sugar: sucrose ratio. Increasing doses of N beyond 100 lb. per acre appeared to increase total and non-protein N and also the chlorine content of the juice, and this adversely affected the colour and keeping quality of the resulting jaggery. *Physiology*: Germination studies indicated that at atmospheric humidities of below 60% the nodal root initials of cane setts remained dormant. Removal of root initials did not affect viability nor rapidity of "germination" of the buds, but if anything hastened the formation of shoot roots and conferred a growth advantage that was maintained up to harvest; these observations come, however, from unreplicated plots and further studies will be needed. Studies are also reported on assimilation of sugar cane leaves based on the leaf punch methods. From studies on sucrose synthesis in leaves it appears that the sugar content of the leaf is indicative of the maturity status of the cane.

Other aspects studied were sheath, leaf and internode measurements as affected by treatment and environment, pith formation as varying between varieties, and between dates of planting, irrigation and fertilizer treatments, and an examination of feeder root systems which were found to be concentrated in the top 6 in. or 1 ft. of soil. *Pests and diseases*: Entomological work which started during the year was concerned mainly with borers. Mycological studies were concentrated on red-rot and smut, the two major cane diseases in the province, and marked variation in susceptibility to smut was found among the more important varieties.

1224. INDIAN TEA ASSOCIATION, TOCKLAI. *Annual Report of the Indian Tea Association, Scientific Department, Tocklai, for 1949, 1950, pp. 38.*

*Manurial experiments*. An NPK experiment showed that inorganic N suppressed the growth of weeds between the bushes. P and K had no significant effect on weed growth, although the phosphate manured plots had shown a heavier growth of weeds in 1940 when the tea bushes were young and not covering the ground. N up to 120 lb. per acre and  $P_2O_5$  up to 20 lb. per acre gave increased yields. In three other NPK experiments responses were obtained from all manurial treatments, though in most cases the addition of P and K to N dressings gave no increased response. Sulphate of ammonia was more effective than oil cake in a heavily shaded experiment on sandy soil. Continuous nitrate of soda applications have been shown to be harmful on sandy soils and on poorly drained clay soils. In an experiment comparing inorganic NPK (40 lb. N) with organic cattle manure (90 lb. N) the inorganic manure gave the highest yield for the first 12 years, but since then there have been no significant differences. *Shade*. Experiments have been started to compare the yield of shaded and unshaded tea at different levels of N manuring and different tipping heights. *Mechanical plucking*. The Tarpen and Grafton machines have been tried, but both are considered too small for large-scale work. The yield from hand plucking was 10-14% higher. *Vegetative propagation*.  $\beta$ -indolebutyric acid was useful for cuttings not taken at the optimum season. Zinc and manganese manuring of the bushes providing cuttings has improved the percentage strike. *Pests and diseases*. Many insecticides have been tested for the control of red spider, aphids, scale insects, crickets and psyllid caterpillars. Various sprays are being tried for winter spraying to control endemic diseases, such as black rot and thread blight.

C.W.S.H.

1225. INSTITUT NATIONAL BELGE DU HOUBLON (HOED, F.). Rapport sur l'activité du Cercle d'Études et de Recherches pour l'Amélioration du Houblon belge, actuellement Institut National Belge du Houblon. (Report on the work of the Circle of Studies and Research for the Improvement of Belgian Hops, now the Belgian National Hop Institute [for 1942-44]. Reprinted from *Ann. Gembl.*, 1948, 54: 113-93 [omitted in error from *H.A.*, Vol. 19].



INSTITUT NATIONAL BELGE DU HOUBLON  
(HOED, F., AND ELSOCHT, P.).

Rapport sur les travaux aux Stations de l'Institut National Belge du Houblon, à Esschene (Brab.) et à Poperinge (Fl. Occ.) en 1948. (Report on the work of the stations of the National Belgian Hop Institute at Esschene (Brabant) and Poperinge (western Flanders) in 1948.)

Reprinted from *L'Echo de la Brasserie*, 1949, 5, Nos. 29, 31, 33, 34, 37, 38, 41, 44, pp. 32, illus.

The first report deals with the work of the Circle of Studies carried out during the period 1942-44, under the headings (1) Variety studies, (2) Manurial studies, and (3) A study of the parasites of hops. In 1946 the National Hop Institute was established, and field stations were set up at Esschene and Poperinge [see *H.A.*, 19:1389]. The work of the new stations is reported in the second paper as follows. *Manurial trials*. The effects were studied of increasing dressings of K and P, supplementary dressings of N and K at time of flowering, application of fertilizers by means of a "pal" injector, stem injections of nutrient solutions, pre-planting immersion of the roots in mineral solutions, and pre-planting treatment of suckers and unrooted shoots with growth substances. *Selection of parent plants for propagation and breeding*. The performance of selections made from several varieties is recorded. *Variety trials* of English and local varieties and new hybrids. Data on the density of the cones of a number of varieties are tabulated. *Plant protection*. Several fungicides were tested for control of *Pseudoperonospora*, and HETP, nicotine and DDT compounds for control of hop aphids. *Maturation studies*. The results of analyses of the alpha and beta acids in samples of the varieties Kent, Hallertau, Saaz and Tettnang, taken at intervals throughout the maturation period, are tabulated.

1226. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.

*Jaarverslag Inst. TuinbTech. Wageningen, 1949, met overzicht van de jaren 1944 t/m 1948. (Annual Report of the Wageningen Institute of Horticultural Technology, 1949, with a review of the years 1944-48 inclusive),* pp. 41, illus.

The Wageningen Institute of Horticultural Technology, which was established in 1944 under the directorship of E. W. B. van den Muijzenberg, undertakes instructional courses, advisory work and research on the use of horticultural machinery and material, including the evaluation of new techniques. This first annual report reviews the foundation, aims and work of the Institute. The research projects reported include the following. 1. The effect of sash bar material (concrete, wood and iron) on glasshouse temperature. 2. The effect of preservatives used on wood, pipes or walls on the growth of plants in frames. 3. Temperature measurements under variously placed cloches. 4. A comparison of different types of glass and glass substitutes in frames. 5. The effect of various covering materials on temperature and light inside a frame. 6. Trials with glass wool as insulating material. 7. A study of temperature and air conditions in gladiolus and bulb

stores equipped with various heating systems. 8. The effect of the location of heating pipes on the development of grape bunches. 9. Protection of plants against night frosts. 10. The use of electricity under low tension for forcing chicory. 11. The effect of method of storage, date of harvesting and date of forcing on the performance of forced chicory. 12. Frequency of mowing in apple and cherry orchards. 13. A comparison of mist spraying with normal spraying and dusting for control of scab in apple orchards. 14. Trials with spraying and dusting machinery. 15. Trials with picking ladders. 16. Trials with fruit grading machinery. 17. A comparison of hand- and machine-sowing of peas. 18. The effect of mixing vermiculite with the surface soil on the germination and growth of glasshouse spinach. 19. A comparison of different methods of planting potatoes. 20. A comparison of various types of spray irrigation equipment. A list of papers published by the staff of the Institute is given in an appendix.

1227. IOWA.

*Report on Agricultural Research of the Iowa Agricultural Experiment Station for the year ending June 30th 1949, 1949, pp. 336.*

Of the many projects reported, the following are of interest to the horticulturist: *Floriculture*. While acid peat is superior for the cultivation of azaleas, they may also be grown successfully in alkaline peat. *Pomology*. Interest in dwarf apple trees continues. Trees in an orchard plot receiving 10 lb. of ammonium nitrate showed increased foliage compared with those receiving 5 lb., but no further advantage was observed from a 15 lb. application. The growth of apple trees planted 33 ft. apart each way in 1924 indicates that 40 ft. would be a better planting distance for most varieties. Breeding is reported on apples, pears, plums, peaches, small fruits and grapes. A brief evaluation is given of 5 new apple varieties, originated at Ames and now named for distribution. Among Jonathan trees growing on 5 different rootstocks, those on stock A587 consistently outyielded trees on other stocks. Several sprays of chlordane provided some control in young orchards where late summer cover crops were badly infested by grasshoppers. *Vegetables*. The new sweet corn hybrid, Lochief, showed great heat and drought resistance. High quality and resistance to scab, blight and virus were the main objectives of potato breeding. Side dressing with complete fertilizer on sweet potatoes resulted in some yield increase, on cantaloupes the increase was considerable, while watermelons benefited most from an ammonium nitrate side dressing. Other trials reported briefly concern starter solutions for sweet potatoes, a soyabean-sweet potato rotation, the effect of a preceding crop of soyabeans on watermelons and cantaloupes, pre-emergence weeding of both species of melons, vegetable varietal responses to herbicides, new crops and varieties for the sandy soils of south-eastern Iowa, improvement of canning pumpkins and tomatoes, onion breeding, irrigation of sweet potatoes, vegetable production in muck and peat soils in northern Iowa, varieties of canning peas, factors affecting the sprouting of sweet potatoes, and marketing of fruits, vegetables and potatoes.

## 1228. KENTUCKY.

*62nd Annual Report of the Director, Kentucky Agricultural Experiment Station, 1949, 1950, pp. 92.*

The report includes brief accounts of work on: *Tobacco*: breeding for resistance to wildfire, virus, and fusarium wilt; new strains of viruses; controlling sucker development; injury to leaves from corn pollen; control of wireworm injury to newly set plants; the effect of N on green manure crops for tobacco; the response of tobacco to minor elements; economic aspects of tobacco growing. *Other crops*: orchard grass varieties and strains; variety trials with sweet corn, tomatoes, potatoes, beans, black raspberries, strawberries and apples; pest and/or disease control on beans, cucumbers, tomatoes, strawberries and peaches; hormone treatment of tomatoes; bands impregnated with plant food in place of clay pots for tomato plants; production of tomato seedlings in vermiculite; weed control experiments with allyl alcohol and methyl bromide in seed beds; mulching red raspberries; peach pruning; comparisons between the hardy apple rootstocks Hibernial crab and Virginia crab; tissue firming in frozen berries and vegetables; consumer preference for sweet corn or green field corn; and marketing pink-ripe tomatoes. Nursery, seed and fertilizer inspections were made and soil testing services were expanded. Brief reports follow from the Western Kentucky and Robinson substations.

## 1229. KENYA.

*Annual Report of Kenya Department of Agriculture for 1948, Parts I, II and III, 1950, pp. 228, 10s.*

This is a very full report of the Department's work and includes detailed descriptions and results of the following investigations. *Coffee*: Propagation by cuttings has passed the experimental stage. Copper sprays have proved their value for controlling leaf fall and increasing yield, but, as spraying with non-copper fungicides has given similar results, there is strong evidence that the copper sprays have been effective through their fungicidal properties rather than through any "tonic" properties. Multiple stem pruning has again proved much superior to single stem. Mulching between rows has proved more satisfactory than mulching with a complete cover. The latter has depressed yields when flowering has followed a wet season. Mechanical cultivation has led to a reduced yield compared with hand cultivation. *Deciduous fruits*: Oil-spraying of apple, pear, plum and apricot trees is being tried for breaking prolonged dormancy. Imported varieties have been planted and trials with various rootstocks have been started. *Sisal*: Spacing trials have shown that high populations lead to increased yields. In view of this, and taking into account the requirements of mechanical cultivation, it is considered that double-row spacing will prove most suitable. Cutting trials show that it is desirable to leave at least 36 leaves on the plant. *Pyrethrum*: Results so far obtained in spacing trials suggest that the optimum plant population is 20,000 or 25,000 plants per acre. In trials with transplanters the Robot proved the most satisfactory and gave a stand of 89% under rather unfavourable weather conditions. In propagation experiments both soft and hardwood cuttings gave

good results. Other work reported includes cultivation and variety trials, and studies on bud disease and on selective herbicides. C.W.S.H.

## 1230. MARSH, R. W.

*Report on a visit to Canada and U.S.A. to study research and development in agricultural fungicides, March 1949 to February 1950.*

[Mimeo. Publ.] agric. Res. Coun. Lond. ARC 12241, 1950, pp. 36.

The main features of American work on fungicidal plant protection are (1) the attempt to control fungi not only on the shoots but also on the roots, (2) progress in the derivation of systemic fungicides, (3) the development of foliage sprays of high fungitoxicity, and (4) the use of spray concentrates. Research and development work on fungicides in Canada and the U.S.A. is considered under the following headings: *Soil fungicides*: fumigants; seedling protectants; seed dressings; systemic bactericides and fungicides. *Foliage fungicides*: on fruit; on potatoes and tomatoes; on other vegetables; on flowers. *Methods of application of fungicides*: concentrate sprayers, their requirements and the results obtained; applications of moistened dusts. The use of therapeutants against plant viruses, while still in the early stages, seems promising. Notes on disease control by means other than fungicides include modification of soil factors through crop rotation, and the breeding of disease-resistant varieties, particularly in potatoes and apples. Mention is made of regulatory work and a useful reference list is included of the proprietary and common names of fungicides noted in this report. From his observations the author recommends that certain foliage protectant fungicides should be imported into Britain for extensive field trials. He further recommends that the performance of concentrate sprayers should be carefully investigated before commercial production is undertaken, that tetramethylthiuram disulphide (Arasan) should be more widely represented in trials of seed protectants, and that trials should be made with thiocarbamate sprays against diseases of flower crops.

## 1231. NEW JERSEY.

*Science and the Land, being 70th Annual Report of the New Jersey Agricultural Experiment Station, 1948-49, pp. 159, illus.*

*Vegetables*. Further studies of "internal browning" of tomatoes [see *H.A.*, 19: 3576] indicate that the cause is not a nutritional one; it is suggested that the disease is caused by a virus, and that certain weeds in which the virus overwinters may be responsible for the initial infection of tomatoes; the disease is not controllable by spraying. Fungicides that control foliage blight on tomatoes are shown to control sunscald too. With asparagus, granular calcium cyanamide applied during the cutting season and potassium cyanate as a water spray during growth gave effective weed control, while 2,4-D caused curling and distortion of the spears. Of the various materials tested for onion thrips control, parathion appears to be outstanding. *Potatoes*. Pest and disease control, manuring and storage problems were examined. *Chemical weed control*. Brief notes are given on herbicides, primarily 2,4-D, used in various



crops. *Tree fruits.* In a greenhouse experiment, nutrient-deficiency symptoms of peach that could be corrected by foliage sprays were: N (with urea), Ca, B, Mn, Fe, Zn, and Mg. A potassium sulphate spray had no effect on K deficiency symptoms. No marked P- and S-deficiency symptoms developed in this test. Cu-deficiency symptoms were corrected by supplying copper sulphate in the nutrient solution. *Small fruits.* Blueberry breeding was re-started in 1949. With grapes, sprays of both Fermate and a new material, SR 406, caused less foliage injury than bordeaux mixture and resulted in more vigorous plants and more uniform ripening of the fruit. *Ornamentals.* Observations on roses following greenhouse fumigation, as well as laboratory tests, showed that a strain of two-spotted spider mite resistant to parathion had developed. It is probable that control may be effected by alternating the use of parathion with that of other miticides, such as tetraethyl pyrophosphate and azobenzene, together with syringing. *Nutrition.* Chemical analyses of shelled peas and corn kernels of plants sprayed or dusted with DDT, DDD and parathion did not reveal the presence of these insecticides.

## 1232. NEW YORK STATE.

*67th Annual Report New York State Agricultural Experiment Station, 1948, 1949, pp. 61.*

The following are among the research activities reported. *Entomology:* control of Japanese beetle larvae in soil, of orchard mites, of oriental fruit moth on quince, of curculio and mites on plum, of Mexican bean beetle and related insects on canning beans; studies of the biology and control of buprestid cane borers on raspberries, of the grape berry moth, of insects causing damage to cannery and market peas, of the squash borer, and of European chafers in nurseries, ornamental plantings and turf areas. *Technology:* studies of the mode of insecticidal action of petroleum and synthetic hydrocarbons; evaluation of better methods of applying fungicides to orchard fruits. *Plant pathology:* breeding of cabbages resistant to cabbage yellows; investigations into control of hop, tomato and grape diseases; seed treatments for canning crops; the development of new fungicides; control of peach leaf curl, brown rot, peach leaf X-disease, and sooty blotch, scab and leaf spots of pears; the effect of urea sprays on the amount of apple scab infection. *Pomology:* the effect of pruning systems and fertilizers on grape production; the production of peach rootstocks from seed; orchard management studies of apples on Malling stocks; fruit breeding; variety and fertilizer trials with hops. *Seed investigations:* germination testing; physiology of germination. *Vegetables:* tomato breeding and selection; sodium as a nutrient for beets; a comparison of methods of growing tomatoes; weeding sweet corn with 2,4-D; fertilizer trials with tomatoes, carrots, snap beans and sweet corn.

## 1233. NEW YORK STATE.

*68th Annual Report New York State Agricultural Experiment Station, 1949, 1950, pp. 53.*

Information on research of horticultural interest is given as follows: *Entomology:* insecticidal and acaricidal evaluation of hydrocarbons in relation to the development of better oil sprays; the control of plum curculio and red banded leaf roller on apples, Japanese beetle and corn earworm on sweet corn, cabbage insects, eye-spotted bud moth, pink and green potato aphid on tomatoes, and aphids in nurseries. *Food science and technology:* varietal adaptability and nutritive value of fruits, berries, and vegetables for freezing; spray residues on fruits and vegetables; the effect of hormone treatment on the composition of economic plants; and investigations on Concord-type grapes. *Plant pathology:* the production and maintenance of virus-free rootstocks for sour cherries; the development of new fungicides; investigations on the control of apple scab, apple rust diseases, tomato leaf blight, and carrot yellows; spray schedules for disease control in grapes; spray injury on grapes; and urea foliage sprays for fruit trees. *Pomology:* variety trials with apples, pears, peaches, plums, cherries, grapes, small fruits and hops; fruit breeding; studies of vineyard tillage; investigations on clonal rootstocks for fruit trees; and the mineral nutrition of blueberries and of orchard trees. *Vegetable crops:* studies on peas, including the "heat unit" method of forecasting maturity; breeding of squash and tomatoes; fertilizer trials with peas, tomatoes, cabbage and beets; comparative yields and returns from tomatoes picked at different stages; chemical weeding of vegetable and fruit crops; and correction of nutritional deficiencies in vegetables. *Seed investigations:* physiology of germination; seed-borne micro-organisms; lawn grass seed mixtures; and seed testing.

## 1234. NEW ZEALAND DIVISION OF HORTICULTURE (GREIG, A. M. W.).

*Report of the Director, Horticulture Division, New Zealand Department of Agriculture. A.R. N.Z. Dep. Agric. for 1949-50, 1950, pp. 109-28.*

For the purpose of greater efficiency a complete separation of the horticultural, inspectorial and advisory services has taken place. Acreages under pome, stone, berry and citrus and other sub-tropical fruits are given with some production figures. Plant protection of all fruits is dealt with; marketing is mentioned. During the year cool storage trials were made with New Zealand grapefruit, and promising results were obtained by storing fruit at 40° to 42° F. for the first 10 days and then at 45° to 47° F. for the remainder of the storage period. Storage trials with tree tomatoes indicated that this fruit can be cool stored satisfactorily at 40° to 42° F. with a relative humidity of 93% for 2 months if picked partly coloured but not ripe. Results obtained from trials with insulated containers of 19 cu. ft. capacity for rail transport of pre-cooled small and stone fruits were satisfactory. Information regarding vineyards, hops, tobacco, beekeeping and vegetables is provided. Further development work is reported from the Horticultural Research Station, Levin. A complete revision of quarantine procedure, the responsibility of the Horticulture Division, was begun during the past year.



1235. NOVA SCOTIA FRUIT GROWERS' ASSOCIATION. *86th Annual Report of the Nova Scotia Fruit Growers' Association 1949*, being Proceedings of the Convention held at Kentville, N.S., December, 1949, 1950, pp. 169.

Papers read at this meeting cover a wide range of problems. They include a review of the newer fungicides and pest control investigations in 1949, including the control of apple maggots. Varieties are recommended for apples, pears, quinces, peaches, cherries, plums and soft fruits. The possibilities of growing horticultural crops other than apples in the Annapolis Valley are discussed. Changes in fertilizer recommendations have been made, mainly because more concentrated materials have lately become available. General storage problems are discussed and a paper is presented on gas storage of apples. A study of apple bruising is described and marketing problems are considered.

1236. "DE PROEFTUIN" TE BOSKOOP.  
*Jaarboek uitgegeven door de Vereniging "De Proeftuin" te Boskoop, 1949. (Year-book of the Society "De Proeftuin" [The Trial Garden], Boskoop, 1949)*, pp. 93, illus.

The report on experimental work includes the following investigations: control of *Verticillium* wilt and *Phragmidium subcorticium* in *Rosa rugosa*; studies of clematis diseases and leaf spot of *Daphne mezereum*; control of the yew beetle (*Otiorrhynchus sulcatus*) on yew, rhododendron, azalea and hydrangea; a determination of the optimum pH of sandy soil for the production of ornamental trees; trials with growth substances, rooting media, etc., for the propagation of apple, plum and pear rootstocks and ornamental shrubs and trees; breeding and selection of shrubs; rootstock trials with roses; artificial lighting for the raising of cuttings of *Rhododendron catawbiense*; weed control with DNC and 2,4-D. There is a note on the layering of plum rootstocks by the East Malling method.

1237. ROTHAMSTED [LAWES AGRICULTURAL TRUST]. *Report of Rothamsted Experimental Station for 1949, 1950*, pp. 179, 5s.

The following investigations of horticultural interest are described briefly in this extensive report: *Chemistry Department*: Statistical analyses of fertilizer trials started in 1934 on rubber in Malaya have shown that responses to N+P applied in the early years were still reflected in increased yields of latex in 1948 and 1949. In trials on oil palms, planted in 1940 on two estates in Nigeria and one in the Belgian Congo, responses to NPK were small and irregular in the early years, but recently there have been moderate improvements from K and slight improvements from N in several experiments, but apart from one trial no responses from P. In fertilizer placement experiments with sugar beet, mangolds and peas, NPK compound fertilizer placed 3 in. deep in bands 1 in. to the side of the seed damaged germination in each case; placed 3 in. to the side it was safe, and, compared with broadcasting, materially increased the yields of peas though not those of the two root crops. In pot experiments on a fen soil low in total Mn the addition of small amounts of molybdate induced "marsh spot" in peas, whereas this did not occur with a mineral soil that was also low in Mn;

it is possible that the effect of molybdate on the fen soil involved an increase in the ratio of soluble N to Mn in the plant. *Botany Department*: In solution culture trials on lettuce with N supplied at 3 rates and Mo also supplied at 3 rates (0, 0.1 and 5 or 10 p.p.m.), the spring variety Tom Thumb showed no benefit from Mo after 3 weeks and some evidence of toxicity from the higher rate, but after 5-6 weeks the dry weight increased with increase in Mo at the two higher rates of N supply; this positive interaction between Mo and N persisted and became greater in the later stages. With the winter lettuce Cheshunt Early Giant, however, Mo did not increase dry weight at any stage, and at 10 p.p.m. actually reduced dry weight especially at the higher levels of N supply. In a pot experiment designed to study the physiological effects of virus infection in potatoes, it was found that high N supply and shading both tended to mask the leaf-rolling and yellowing symptoms in Craig's Defiance potatoes infected with leaf-roll virus. *Statistics Department*: A survey of main crop potatoes is in progress, which is designed to furnish precise information on agricultural practices and to test the possibility of estimating the yield of the crop by digging up and weighing short lengths of row as near to lifting date as possible. *Plant Pathology Department*: The sizes and shapes of several viruses and virus strains affecting tobacco, potato, tomato and cucumber have been determined with an electron microscope. *Biochemistry Department*: Investigations are reported on leaf components, notably proteins and enzymes, and on the oxidation of Mn by peroxidase systems in plant extracts. *Other departmental reports* include those on pedology, soil microbiology, nematology, entomology, bees, insecticides and fungicides, field experiments and the Woburn experimental station. Special reviews are given on nutritional problems in forest nurseries and on the relation between soil cultivation and crop yields, the latter being described separately in abstract 710.

1238. ROTHAMSTED (LAWES AGRICULTURAL TRUST). *Results of field experiments 1948. [Publ.] Rothamsted Exp. Stat., [1950 ?], pp. numerous, 5s.*

The summaries and tables given in this report are similar to those contained in the appendices to the Annual Reports of the Station before the war. Reports covering the war years are being prepared.

1239. SCOTTISH SOCIETY FOR RESEARCH IN PLANT-BREEDING.  
*Report by the Directors and Report by the Director of Research to the Annual General Meeting, July 1950*, Corstorphine, Edinburgh, 1950, pp. 55.

Progress in plant breeding is reported for cereals, beans, potatoes, herbage plants, swedes, kales, broccoli and sugar beet. With potatoes fully 10,000 seedlings were raised during 1949, of which over 4,000 were planted out and from which 736 were retained for further trial. Of seedlings in their second year 30 were selected for further trial, and of older seedlings 63. Factors being considered in the breeding of potatoes are resistance to various strains of blight, field immunity to mosaic viruses, and resistance to leaf-roll virus, scab, blackleg (*Bacillus phytophthorum*), and to frost.



## 1240. TANGANYIKA (LOCK, G. W.).

*Annual Report of the Sisal Experimental Station for 1948, 1950*, pp. 24, 1s.

The main problem under investigation was that of the maintenance of soil fertility. Second and third cycles of sisal have shown decreasing yields. *Cultivation*: An experiment, started in 1936 with various weeding and cover crop treatments, has shown that although clean weeding gave the highest yields in the first cycle, the drop in yield from the first to second cycles has been greater in the clean weeded plots than in plots planted with a cover crop. The experiment is to be continued to determine the rate of soil exhaustion under the various treatments. *Spacing*: The closest spacing, 2×0.5 metres, has continued to give the highest yield, but it is pointed out that this close spacing is impracticable on a large scale. Another experiment has shown that double row spacing gives the same yields as single row spacing. *Soil fertility*: This experiment is planted on the 2-row system to allow inter-row disc harrowing. Harrowing is compared with cover cropping and elephant grass intercropping in the first cycle. This is to be followed by different types of fallow. The elephant grass intercropped plots are backward. *Manuring*: An NPK factorial experiment on the station has shown no responses to fertilizers but, in an outside NPK experiment, K reduced the severity of banding disease which attacked the area in 1947. *Cutting*: Higher fibre yields were obtained by starting to cut early, at 2 years old. Cutting cycles of 6, 12 and 15 months' duration have been tried. The first two have so far given similar yields but the 15-month cycle has reduced yields. *Planting methods*: Trimming leaves before planting out has reduced growth. Trimming roots and different depths of planting have had no effect on growth. *A. amaniensis* × *A. angustifolia* hybrids are under trial. C.W.S.H.

## 1241. UGANDA.

*Annual Report of the Uganda Department of Agriculture for the period 1st April 1947 to 31st March 1948, Part II Experimental*, 1950, pp. 96, 3s.

*Coffee*. In an experiment with robusta coffee to compare weeding, mulching and a cover crop of *Leucanea glauca*, the last treatment has now given as high a yield as the other two. Earlier the *L. glauca* had competed with the young coffee trees, but these have now shaded out the cover crop in their immediate vicinity. Yields in unshaded plots were higher than in plots shaded by *Ficus* or *Albizia stipulata*. In variety trials erect robusta coffee has given higher yields than spreading, though the difference in yield is gradually decreasing. Selections have been made within both spreading and erect strains. With arabica coffee, spacing, pruning and replanting trials were continued. *Cordia* remained the best shade. A parasite, *Corioxenos antestias*, has been introduced for the control of the bug *Antestia* but its spread has been very slow. *Tobacco*. Olsen 68 has proved the highest yielding variety and gave the highest nicotine percentage. At altitudes of 6,500 and 7,500 ft. there were no significant yield differences between spacing at 3 ft. × 2 ft. and 2 ft. × 2 ft., but the wider spacing gave a higher nicotine percentage. *Potatoes*. 35 South American potato varieties obtained from Cambridge

have shown promise. *Sweet Potatoes*. The highest yields were obtained from planting early and lifting late. There were big differences between the yields of local varieties. The West Indian variety, Caroline Lea, yielded well. *Urena lobata*. Seed collected at the end of the fruiting season (September) gave the best germination. C.W.S.H.

1242. VIENNA, BUNDESANST. F. PFLANZENBAU U. SAMENPRÜFUNG.  
*Jahresbericht 1949 der Bundesanstalt für Pflanzenbau und Samenprüfung in Wien*. (Annual report of the Institute for crop production and seed testing, Vienna, for 1949), being *Bodenkultur*, July, 1950, 1st Sonderheft, pp. 191.

The report is introduced by the Director, R. Bauer, who briefly surveys the activities of the institute (pp. 1-7), the work of the seed testing station being summarized by H. Germ (pp. 8-12). Papers of horticultural interest are abstracted separately in the appropriate sections of this number.

## New periodicals.

1243. KONTOR ET FOR LANDBRUKSFORSKNING.  
*Forskning og forsøk i landbruket*, 1950, Vol. 1, No. 1, 9½ × 6½ in., pp. 90.

*Research in Norwegian Agriculture*, as the English subtitle of the journal runs, is published by the Office of Agricultural Research, Oslo, primarily to present results obtained at the State and semi-official agricultural and horticultural research stations in Norway. The publication of reviews on Norwegian and foreign work is also planned. Each paper has an English summary.

## Noted.

1244.  
a 23rd A.R. agric. Res. Inst. N. Ireland, Hillsborough, for 1949-50, 1950, pp. 43.  
b BARNETT, H. L.  
*Malayan agricultural statistics 1947*. Econ. Ser. Dep. Agric. Malaya 13, 1949, tables 98, \$5.  
c BRITISH COLUMBIA, DEPARTMENT OF AGRICULTURE.  
*Climate of British Columbia. Tables of temperature, precipitation and sunshine. Report for 1949, 1950*, pp. 26.  
d CAMBRIDGE UNIVERSITY LIBRARY.  
*List of current foreign periodicals, 1950*. University Press, Cambridge, 1950, pp. 283, 10s. 6d.  
A subject index is included.  
e GREIG, J. L.  
*Malayan agricultural statistics 1948*. Econ. Ser. Dep. Agric. Malaya 14, 1950, tables 101, \$5.  
f A.R. National Research Council of Canada, 1949-50, being N.R.C. 2153, 1950, pp. 41 English, 43 French.

NOTES ON BOOKS AND REPORTS

- g ORGANIZATION FOR EUROPEAN ECONOMIC  
CO-OPERATION.  
Agricultural advisory services in European  
countries.  
[Publ.] O.E.E.C., Paris, 1950, pp. 232,  
2s. 6d.  
The report of a working party of experts.
- h SINGAPORE (HENDERSON, M. R.).  
*A.R. Botanic Gardens Department for 1949*,  
1950, pp. 6, illus., 50 cents.
- i SPEIRS, J. M., AND JOHNSTON, J. M.  
Bibliography of Canadian biological publica-  
tions for 1947.  
[Publ.] Res. Coun. Ontario, 1950, pp. 102.